

**ORANGE COUNTY
SOIL AND WATER
CONSERVATION DISTRICT**



**LOST RIVER WATERSHED
FINAL WATER QUALITY MONITORING STUDY**



**V3 Companies
September 2006**

LOST RIVER WATERSHED FINAL WATER QUALITY MONITORING STUDY

TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
1.0.....EXECUTIVE SUMMARY	1
2.0.....ACKNOWLEDGEMENTS	3
3.0.....INTRODUCTION	3
4.0.....METHODS	10
4.1 Biological Evaluation Methods.....	10
4.2 Physical Evaluation Methods.....	10
4.3 Chemical Evaluation Methods.....	10
5.0.....RESULTS	11
5.1 Biological Evaluation Results.....	11
5.2 Physical Evaluation Results.....	14
5.3 Chemical Evaluation Results	15
5.4 Field Review	18
6.0.....DISCUSSION	18
7.0.....SUMMARY AND RECOMMENDATIONS.....	26
8.0.....REFERENCES	28

LIST OF TABLES

PAGE

TABLE 1 – LOST RIVER WATERSHED, ACRES OF WINTER COVER CROP	4
TABLE 2 – LOST RIVER WATERSHED, SAMPLING STATIONS	9
TABLE 3 – BENTHIC MACROINVERTEBRATE COLLECTED BY STATION, APRIL 2004	12
TABLE 4 – BENTHIC MACROINVERTEBRATE RESULTS, SEPTEMBER 2004	13
TABLE 5 – BENTHIC MACROINVERTEBRATE BIOLOGICAL CONDITION SCORING, SEPTEMBER 2004	14
TABLE 6 – QHEI RESULTS FOR LOST RIVER, SEPTEMBER 8, 2004	14
TABLE 7 – SUMMARY OF BASEFLOW SAMPLING WATER QUALITY DATA FOR LOST RIVER, JUNE 29 AND 30, 2004	16
TABLE 8 – SUMMARY OF STORMFLOW WATER QUALITY DATA FOR LOST RIVER, JANUARY 5 AND 6, 2005	17
TABLE 9 – BENTHIC MACROINVERTEBRATE AND HABITAT RESULTS FROM IDEM	24
TABLE 10 – WATER QUALITY RESULTS FROM IDEM	24

<u>LIST OF EXHIBITS</u>	<u>PAGE</u>
EXHIBIT I – PROJECT VICINITY MAP	5
EXHIBIT II – SAMPLING STATIONS, WATERSHED MAP.....	6
EXHIBIT III – SAMPLING STATIONS, STREET MAP	7
EXHIBIT IV – BEST MANAGEMENT PRACTICES	19
EXHIBIT V – MODIFIED BIOTIC INDEX (MBI) FROM BIOLOGICAL CONDITION, SEPTEMBER 2004 .	19
EXHIBIT VI – PERCENTAGE OF REPRESENTATIVE REFERENCE STATION FOR BIOLOGICAL CONDITION AND HABITAT, SEPTEMBER 2004	20
EXHIBIT VII – AMOUNT OF NITRATE IN MG/L FROM BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005	21
EXHIBIT VIII – NUMBER OF COLONY FORMING UNITS (CFU) OF <i>E. COLI</i> IN BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005	22
EXHIBIT IX – TURBIDITY VALUES IN NTU’S FOR BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005	23

APPENDICES

APPENDIX I – V3 COMPANIES FIELD DATA SHEETS

APPENDIX II – MACROINVERTEBRATE VOUCHER SPECIMENS

APPENDIX III – STATION PHOTOGRAPHS

APPENDIX IV – LABORATORY REPORTS

APPENDIX V – IDEM DATA

1.0 EXECUTIVE SUMMARY

V3 Companies, Ltd (V3) has conducted the Lost River Watershed Final Water Quality Monitoring Study for the Orange County Soil and Water Conservation District (SWCD). Exhibit I shows the Project Vicinity. There are ten sampling stations for evaluating the biological, physical and chemical condition of the watershed including: macroinvertebrate communities, in-stream and riparian habitat and water quality parameters. The watershed of the Lost River is within the karst regions surrounding Paoli, Indiana. The term karst implies the processes and phenomena associated with the dissolution of bedrock by water. Karst regions typically contain sinkholes, sinking streams, disrupted surface drainage, caves and underground drainage systems. This study includes sampling locations within surface riverbeds, underground caverns, swallow holes, gulfs, true-rises and drybeds of Lost River.

The Lost River watershed evaluated during this study is 106,980 acres. The portion of the river evaluated during this study has a linear river length of approximately 15.3 miles for perennial surface water in the upstream reaches, approximately 21.3 miles of linear length for intermittent drybeds, an estimated 7.5 miles of linear length for underground river systems, and another perennial surface water stream segment of approximately 25.8 miles for linear length in the downstream reaches. Beyond the watershed which was studied, there is approximately 20.5 miles linear length of the Lost River downstream of the studied area before the Lost River ends at it's confluence with the White River. This watershed study includes eight sampling stations on Lost River, one sampling station on South Fork Lost River and one on Carter's Creek. Of these locations, 4 were sampled for macroinvertebrates, 8 were sampled for water quality during baseflow conditions and 9 were sampled for water quality during stormflow conditions (see Exhibit II). This study follows the guidelines suggested by the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) Program. This study was funded by the IDNR's LARE program.

Land use best management conservation practices were implemented by the Orange County SWCD to improve the Lost River watershed from 2001 through 2005. The land use best management conservation practices included: winter cover crop, heavy use area feeding pads, spring development and acres pasture/hayland planting.

Prior to the implementation of the best management practices, there was no baseline study performed to establish the conditions of water quality, macroinvertebrate communities and habitat. The study performed by V3 in 2004 and 2005 will provide information on existing conditions for future comparisons, however, it does not allow for any current interpretation on the watersheds benefits from the implementation of these conservation practices. We will attempt to make comparison between the high flow and low flow sampling events, as well as station to station evaluations, in order to speculate on the effectiveness of conservation practices within the watershed. Macroinvertebrate monitoring and habitat evaluations were conducted using the methods provided by the U.S. Environmental Protection Agency. Habitat was evaluated by using the Qualitative Habitat Evaluation Index (QHEI). Water quality measurements recorded both in the field with water quality meters and in the laboratory.

V3 followed the LARE guidelines for sampling during high and low flow events. Low flow event water quality sampling was performed on June 29 and 30, 2004. Macroinvertebrate evaluation was also performed during this timeframe, as this fell within the LARE recommended late summer sampling season. The timing on high flow event samples were unable to be performed during the calendar year of 2004, however, on January 5 and 6, 2005 a storm event contributed approximately 2.87 inches of rain from January 1-4 and 2.90 inches on January 5 (the first day of sampling) within the watershed (www.accuweather.com 2006). Local IDNR staff were present during all of the sampling events and assisted with the collection effort.

The biological evaluation of macroinvertebrate communities performed by V3 followed the multihabitat approach provided in the USEPA Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers, Periphyton, Benthic Macroinvertebrates and Fish, Second Edition, publication number EPA 841-B-99-002. The preference of the LARE program is to follow the single habitat approach as described within the above mentioned USEPA publication or the RBPIII protocol as it is described in the USEPA Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish, publication number EPA/440/4-89/001. It is important for subsequent evaluations and comparisons to be aware of this data collection discrepancy.

The evaluation of macroinvertebrate communities within the watershed describe the biological health at a level which provides insight into point and nonpoint source impacts which otherwise may or maynot be able to be measured. All four of the evaluated stations posses a slightly impaired biological condition.

Habitat incorporates all aspects of physical and chemical constituents along with the biotic interactions. Habitat includes all of the instream and riparian habitat that influences the structure and function of the aquatic community in a stream. All four of the sampling stations evaluated for habitat during the Lost River Watershed Final Water Quality Monitoring Study resulted in Good habitat ratings.

Water quality analysis of the watershed during baseflow and stormflow events showed acceptable values with the following exceptions. Phosphorus levels were high at 1,2,3,4,5,7,8,9 and 10 during stormflow sampling in January 2005 and at 1,2,3,6,7,9 and 10 during baseflow sampling in June 2004. Nitrate was measured at high levels at both Stations 1 and 3 during the June 2004 sampling effort. The stations with the highest levels of *E coli* were baseflow conditions at Station 1 (6,300 cfu/100ml) along the South Fork Lost River and stormflow condition at both drybed sampling stations along Lost River, Stations 5 (4,800 cfu/100ml) and Station 8 (5,000 cfu/100ml). Stations 5 and 8 also shared the highest turbidity levels, Station 5 (80 NTU) and Station 8 (85 NTU).

In areas of good or excellent habitat, biological communities will reflect degraded conditions when water quality effects are present. This graph demonstrates a condition where organic pollution or toxicants will adversely affect biological condition regardless of the quality of the habitat.

Land use best management conservation practices have been implemented within the 106,980 acres of Lost River's evaluated watershed. We recommend the continued implementation of habitat focused watershed improvement measures within the entire Lost River watershed. We recommend that similar evaluations use the results of this study to make comparisons on the health trends of the macroinvertebrate, habitat and water quality conditions of the watershed.

2.0 ACKNOWLEDGEMENTS

We would like to acknowledge Frank Hodges (with IDNR at the time of V3's survey) for his assistance with historical data collection and field sampling efforts. We would like to acknowledge Treva Brim of the Orange County SWCD for her assistance with sampling efforts, her coordination of historical landuse data and her handling of contracts. We would also like to acknowledge Cecil Rich (IDNR, LARE Program Biologist) for his guidance, review and comments.

3.0 INTRODUCTION

V3 has provided technical services to the Orange County SWCD in conducting the Lost River Watershed Post-Construction Monitoring Study in Orange County, Indiana. The Orange County SWCD has performed several land use conservation practices throughout the watershed to improve water quality conditions from 2001 to 2005. The Lost River is a very unique river. It is an underground river that flows through caves at depths up to about 150 feet below the surface. When the river comes to a blockage in the cave or enough volume is not flowing through the water flows to the surface and creates a "rise". Then the river flows on the surface until it finds a sinkhole and it flows back into the caves. In areas the river is completely underground during normal conditions. In a storm event the river rises and flows in river beds that are normally dry.

The majority of the studies 106,980 acre Lost River watershed (see Exhibit I) is within Orange County, with the downstream western most portions extending into Martin County and the upstream portion extending into Washington County. The portion of the river evaluated during this study has a linear river length of approximately 15.3 miles for perennial surface water in the upstream reaches, approximately 21.3 miles of linear length for intermittent drybeds, an estimated 7.5 miles of linear length for underground river systems, and another perennial surface water stream segment of approximately 25.8 miles for linear length in the downstream reaches. The underground portions of the river system are difficult to quantify as the majority of the system has not been mapped, and much of it has not been explored. There is approximately 20.5 miles linear length of the Lost River downstream of the studied area which was not included in this evaluation before the Lost River ends at it's confluence with the White River. This study follows the guidelines suggested by the IDNR LARE Program. The LARE program provided the funding to carry out the post-treatment monitoring study.

There are ten identified sampling stations that were monitored in the Lost River Watershed. There were three separate sampling efforts in this study. The baseflow sampling occurred on June 29 and 30, 2004; stormflow sampling occurred on January 5 and 6, 2005; and the biological sampling occurred on September 8 and 9, 2004. Stations 1, 2, 3 and 4 had all three sampling efforts performed during the study. Stations 7, 9 and 10 had baseflow and stormflow

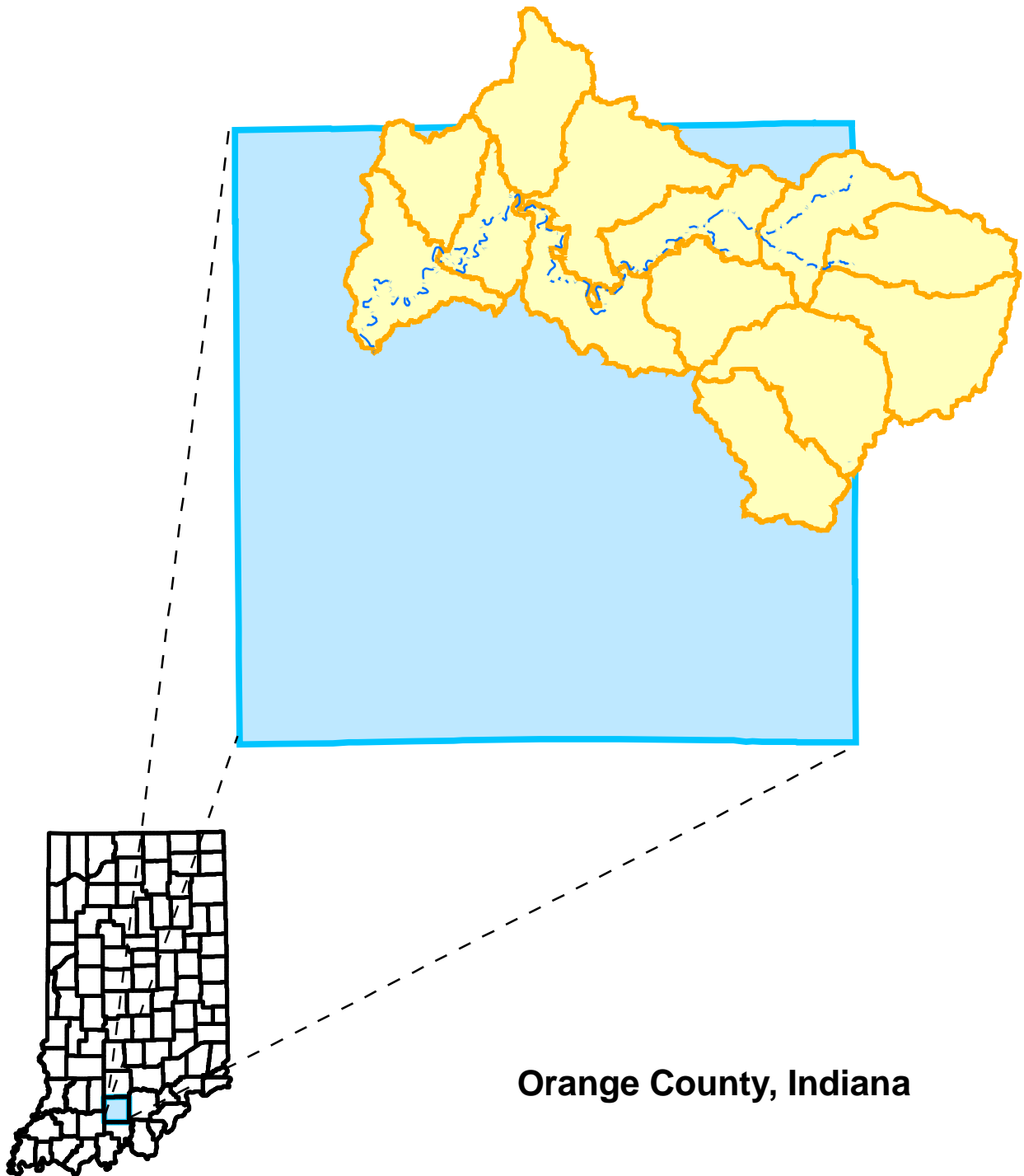
measurements performed. Station 6 had only base flow measured because it is Tolliver Swallow Hole and was not assessable during storm flow. Stations 5 and 8 are dry beds and only have water in them during storm events so were only sampled during the storm flow. There was no reference station identified for the Lost River. It is difficult to identify ideal parameters for such an atypical river ecosystem within the karst regions. The study had been designed to omit the reference station, before V3 bid on the study. For purposes of making the USEPA evaluation within this report, we have created a representative reference condition. This representative condition was created by selecting the best recorded value for each of the evaluated conditions, and projecting an achievable condition for the system that is not specific to one location. All sampling stations are shown on Exhibit II.

The Orange County SWCD has performed several land use conservation practices throughout the watershed to improve water quality conditions. Measurements of the proportions of land using conservation tillage practices were not available for comparison throughout the years since the previous monitoring study was conducted. Locations of Lost River's best management practices are shown in Exhibit III. The amount of winter cover crop used from 2001-2005 is shown in Table 1. Other best management practices implemented during 2005 included eleven heavy use area feeding pads, one spring development and 59 acres of pasture/hayland planting.


TABLE 1 – LOST RIVER WATERSHED, ACRES OF WINTER COVER CROP

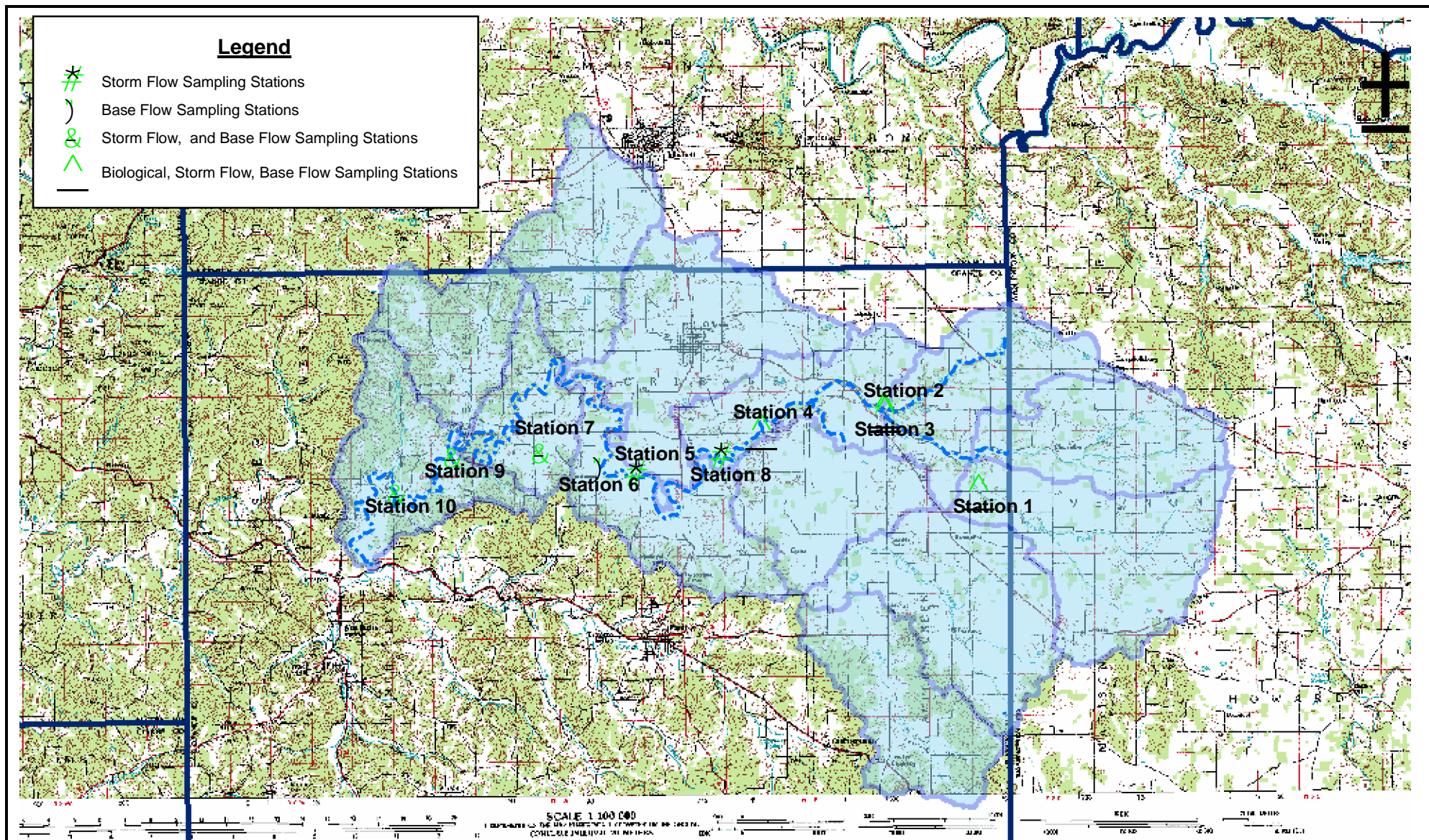
Year	Acres of Cover Crop
2001	1,500
2002	2,000
2003	3,000
2004	1,394.4
2005	641.3


Lost River Watershed

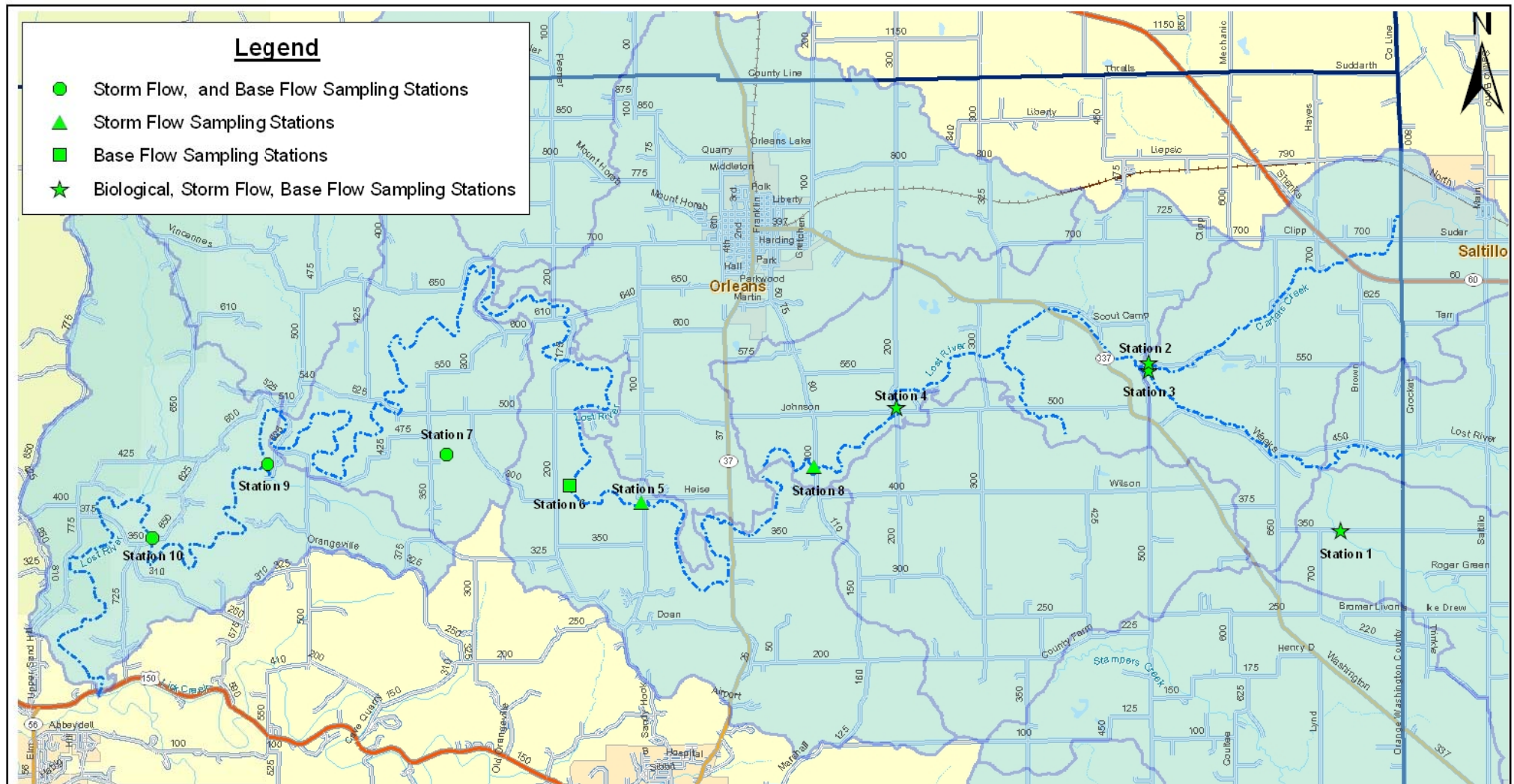


Orange County, Indiana

 Engineers Scientists Surveyors	7325 Janes Avenue, Suite 100 Woodridge, IL 60517 630.724.9200 voice 630.724.9202 fax v3consultants.com	TITLE: Project Vicinity Map	PROJECT: Lost River Water Quality Analysis		
		BASE LAYER: N/A	PROJECT NO. 04010	EXHIBIT: I	SHEET: 1 OF: 1
		CLIENT: Orange County Soil and Water Conservation District 573 SE Main Street Paoli, Indiana 47454	QUADRANGLE: N/A	DATE: 02-01-05	SCALE: NTS



 Engineers Scientists Surveyors	7325 Janes Avenue, Suite 100 Woodridge, IL 60517 630.724.9200 voice 630.724.9202 fax v3consultants.com		PROJECT: Lost River Water Quality Analysis		
	TITLE: Sampling Stations Exhibit		PROJECT NO.: 04010	EXHIBIT: II	SHEET: 1 OF: 1
	CLIENT: Orange County Soil and Water Conservation District 573 SE Main Street Paoli, Indiana 47454		QUADRANGLE: N/A	DATE: 02-02-05	SCALE: NTS



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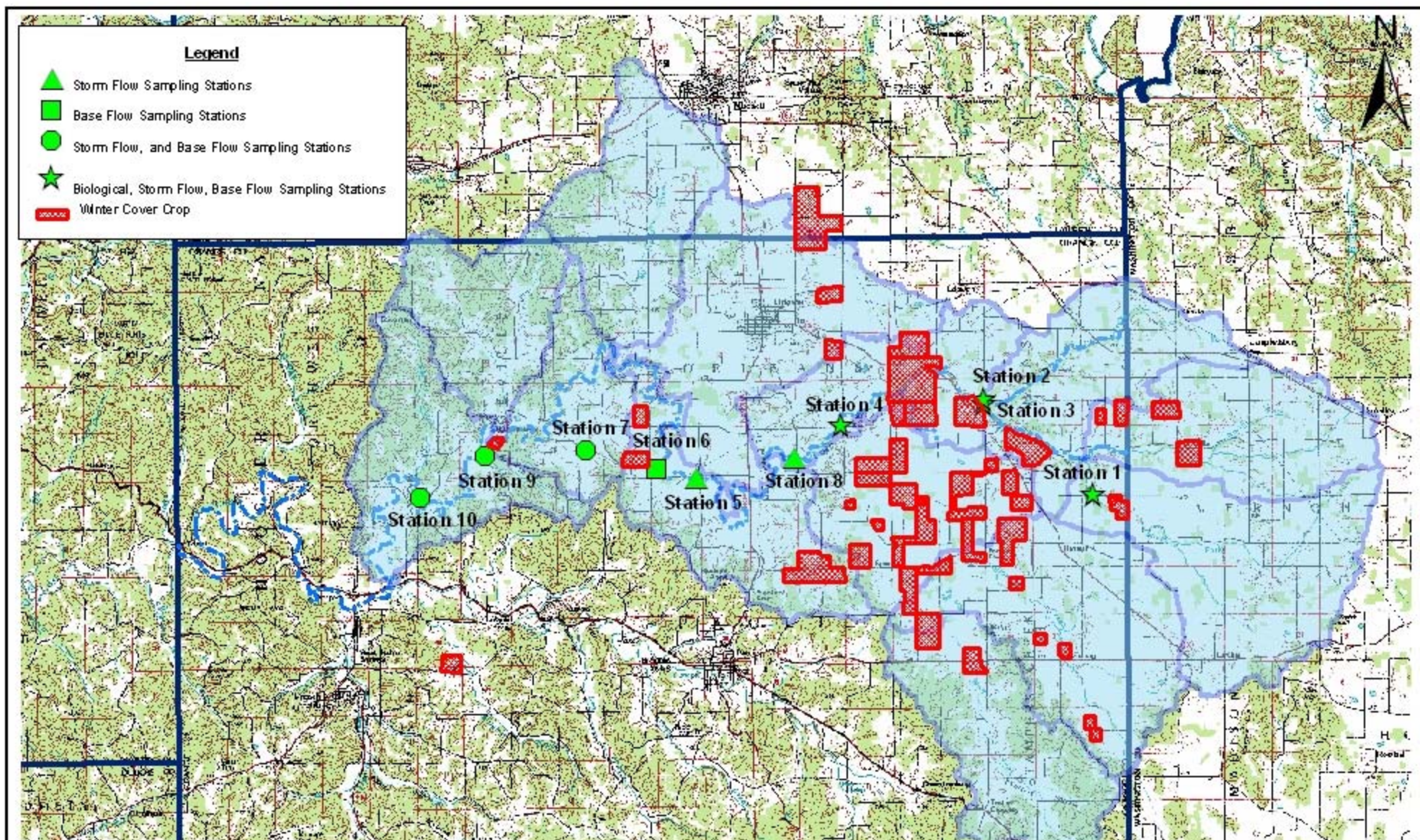
TITLE:
Sampling Stations Exhibit


BASELAYER:
USGS Topographic Map

PROJECT:
Lost River Water Quality Analysis

PROJECT No.:	QUADRANGLE:	DATE:	SCALE:	EXHIBIT:
04010	N/A	9/18/06	NTS	III

SHEET: 1
OF: 1



 <p>V3 Companies 7325 Janes Avenue Woodridge, IL 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	TITLE: 2004 Winter Cover Crop Locations		PROJECT: Lost River Water Quality Analysis		
	BASE LAYER: USGS Topographic Map		PROJECT NO.: 04010	EXHIBIT: IV	SHEET: 1 OF: 1
	CLIENT: Orange County Soil and Water Conservation District 573 SE Main Street Padi, Indiana 47454		QUADRANGLE: N/A	DATE: 12-15-05	SCALE: NTS

In 2004 and 2005, V3 performed the Final Water Quality Monitoring Study in accordance with the guidelines suggested by the IDNR LARE Program. V3 also performed the base flow, storm flow and biological sampling efforts within the LARE Program's designated timeframes, and as a direct result from discussions with regional IDNR staff and Orange County SWCD employees.

The Lost River watershed is in a predominantly rural agricultural and is approximately 106,980 acres upstream of sampling station 10. Lost River terminates at it's confluence with the East Fork of the White River. The thirteen different 14-digit hydrologic unit codes (HUC) for the Lost River watershed are 05120208150010, 05120208150020, 05120208150030, 05120208150040, 05120208150050, 05120208150060, 05120208150070, 05120208150080, 05120208150090, 05120208150100, 05120208150110, 05120208150120 and 05120208160010. All of the studies sampling stations are described in Table 2, and shown in Exhibit II.

TABLE 2 – LOST RIVER WATERSHED, SAMPLING STATIONS

	Waterway	Location	Sampling Efforts *	Watershed Area (acres)
Station 1	South Fork Lost River	CR 350 N	M,S,B	11,269
Station 2	Carter Creek	Tater Road	M,S,B	5,895
Station 3	Lost River	Tater Road	M,S,B	22,349
Station 4	Lost River	Fishers Ford Bridge	M,S,B	61,778
Station 5	Lost River	CR 100 W	S	68,730
Station 6	Lost River	Tolliver Swallow Hole	B	70,015
Station 7	Lost River	Wesley Chapel Gulf	S,B	95,599
Station 8	Lost River	Roosevelt Road	S	62,520
Station 9	Lost River	True Rise	S,B	105,004
Station 10	Lost River	Orangeville Road	S,B	106,980

* M = macroinvertebrate
S = stormflow
B = baseflow

All of the stations were selected to provide interpretive data on the respective portions of the watershed. Stations 1-4 are the most upstream portions of the project and flow above ground year round so it was possible to take samples during all three of the efforts (baseflow, biological and stormflow). Stations 7, 9 and 10 are too deep for biological sampling, so only baseflow and stormflow data collection was possible, so the depth of the Wesley Chapel Gulf, True Rise and downstream most station on the mainstem of Lost River did not have an evaluation of macroinvertebrates. Stations 5 and 8 are drybeds with intermittent flow, so only flow under storm conditions was possible, no baseflow or macroinvertebrate data could be collected. Station 6 is below ground in a cavern, so collecting stormflow data would be dangerous and the macroinvertebrate community would be atypical as it is underground, therefore only baseflow sampling was performed.

4.0 METHODS

4.1 Biological Evaluation Methods

Macroinvertebrate monitoring followed the USEPA's Benthic Macroinvertebrate Protocol for the multihabitat approach. The multihabitat approach involves the systematic collection of benthic macroinvertebrates from all available instream habitats by kicking the substrate or jabbing with a dip net. A total of 20 jabs or kicks are taken from all major habitat types in the reach resulting in sampling approximately 3.1 m² of habitat. The collected organisms are sorted in the V3 laboratory and identified to the lowest practical taxon. The collection procedure provides representative macroinvertebrate fauna from all of the available instream habitats including riffle and run habitat types that provide representatives of scraper and filterer functional feeding groups, and Course Particulate Organic Matter (CPOM) such as detritus, leaves, needles, twigs, sticks, bark and other fragments that provide representatives of the shredder functional feeding group. Sources of CPOM include leaf packs, shorezones and other depositional areas.

Although the multihabitat approach is provided in the USEPA Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers, Periphyton, Benthic Macroinvertebrates and Fish, Second Edition, publication number EPA 841-B-99-002, the LARE program would have preferred that the study had followed the single habitat approach as described within that same publication or the RBPIII protocol as it is described in the USEPA Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish, publication number EPA/440/4-89/001. The data from survey of the benthic macroinvertebrate community shortly after the implementation of the land use conservation practices would have been more readily compared to the data from this survey had the methodology been the same.

Although the reference station is often selected outside of the treatment watershed, it was thought that the atypical karst system of the Lost River did not translate accordingly to an ideal reference stream within a different watershed. In order to provide comparative analysis on the data gathered from this study, a hypothetical station was created using the best data from combining all of the sampling stations.

4.2 Physical Evaluation Methods

Habitat evaluation followed the Ohio EPA Qualitative Habitat Evaluation Index (QHEI) habitat assessment approach.

4.3 Chemical Evaluation Methods

Water quality analysis was measured in the field using an In-Situ Multi Parameter TROLL 9000, YSI Model 50B Dissolved Oxygen Meter, LaMotte 2020 Turbidimeter, and MARSH-McBIRNEY FLO-MATE Model 2000 Portable Flowmeter. V3 performed the water quality measurements for the following parameters: oxidation-reduction potential, temperature, conductivity, pH, dissolved oxygen, flow and turbidity. V3 also collected water samples for

water chemistry analysis in a laboratory for the following parameters: Ammonia, Nitrate, Nitrite, Total Kjeldahl (baseflow only), Dissolved Phosphorous, Total Phosphorous and *Escherichia coliform*.

5.0 RESULTS

5.1 Biological Evaluation Results

Appendix I contains the field and laboratory data sheets for the benthic macroinvertebrate communities. Appendix II contains the transmittal letter and photo-documentation from V3 to Purdue University, Department of Entomology which accompanied the thirty four (34) voucher specimens of macroinvertebrates collected during the 2004 study, as well as the response letter from Dr. Arwin Provonsha of Purdue stating that all 35 macroinvertebrates are accurately identified. Table 3 lists the macroinvertebrates that were collected during the September 8 and 9, 2004 sampling event at each of the four stations. Table 4 lists general data for the USEPA evaluation metric by sampling station.

TABLE 3 – BENTHIC MACROINVERTEBRATE COLLECTED BY STATION, APRIL 2004

ORDER	FAMILY	GENUS	SPECIES	STATION NUMBER			
				1	2	3	4
Tubellaria	Planaria			1	2	3	5
Pelecypoda	Corbiculidae	Corbicula	fluminea			1	
Gastropoda	Physidae			1			
	Planorbidae						1
	Pleuroceridae			13	4	19	24
Annelida	Hirudinea						1
Decapoda				1	2	2	3
Amphipoda					10	3	2
Isopoda	Asellidae						2
Ephemeroptera	Baetidae			25	13	1	4
	Heptageniidae	Stenacron			2	3	
	Heptageniidae	Stenonema		16	1	4	7
	Isonychiidae	Isonychia		1		2	
Coleoptera	Haliplidae				1		
	Elmidae				9	10	12
	Psephenidae	Psephenus		4	7	20	15
Megaloptera	Corydalidae	Corydalus		1		1	
	Corydalidae	Nigronia			1	1	
Trichoptera	Helicopsychidae	Helicopsyche		1		6	8
	Hydropsychidae			11	13	2	2
	Odontoceridae						1
	Philopotamidae	Chimarra		2	3	8	
Hemiptera	Belostomatidae						1
	Gerridae			1	3	2	
	Veliidae	Rhagovelia		2			
Plecoptera	Perlidae	Claassenia		1	5	3	1
Odonata- Anisoptera	Aeshnidae			3	2	2	
	Corduliidae						1
Odonata- Zygoptera	Calopterygidae	Calopteryx		14	3	1	3
	Coenagrionidae	Argia			3	2	7
Diptera	Blood-red Chironomidae			1	1		
	Other Chironomidae			1	12	3	
	Culicidae				1		
	Tipulidae				2	1	
Total Number of Individuals Evaluated				100	100	100	100

TABLE 4 – BENTHIC MACROINVERTEBRATE RESULTS, SEPTEMBER 2004

Parameter	Relative Reference	Station 1	Station 2	Station 3	Station 4
Total Number of Taxa	23	19	22	23*	19
Total Number of EPT Taxa	8	7	6	8*	6
Percent Contribution of Dominant Taxa	13	25	13*	20	24
Ratio of EPT/Chironomidae	57	57*	2.8	9.7	23/0
Modified Biotic Index	3.9	4.0	4.3	3.9*	4.2
Ratio of Scraper/Filterer	27.5	2.5	0.875	4.0	27.5*
Ratio of Shredder/Nonshredder	0.11	0.01	0.11*	0.03	0.04
Total Number of Individuals Evaluated	-	100	100	100	100

* indicates highest quality, used as reference station.

The best score from the four evaluated stations was assigned to the relative reference station as an achievable value for the Lost River watershed. Then station scores are compared to the relative reference station and assigned biological condition categories based on percent comparison. The biological condition scoring criteria for each benthic macroinvertebrates parameter assigns numeric values based on specific percentage of comparability with the reference. Qualitative results are converted into quantifiable numeric values of 6 for nonimpaired, 4 for slightly impaired, 2 for moderately impaired, and 0 for severely impaired.

The total metric score is then compared to the reference station to provide impairment category results based on >83% of the reference station for nonimpaired, 51-82% for slightly impaired, 18-50% for moderately impaired, and <17% comparability with the reference station for severely impaired. These results are shown in Table 5.

TABLE 5 – BENTHIC MACROINVERTEBRATE BIOLOGICAL CONDITION SCORING, SEPTEMBER 2004

Parameter	Relative Reference	Station 1	Station 2	Station 3	Station 4
Total Number of Taxa	6	6	6	6	6
Total Number of EPT Taxa	6	4	2	6	2
Percent Contribution of Dominant Taxa	6	4	6	4	4
Ratio of EPT/Chironomidae	6	6	0	0	6
Modified Biotic Index	6	6	6	6	6
Ratio of Scraper/Filterer	6	0	6	2	4
Ratio of Shredder/Nonshredder	6	0	0	0	6
Total Score	42	26	26	24	34
Percent of Reference	100	62	62	57	81
Impairment Category	None	Slight	Slight	Slight	Slight

5.2 Physical Evaluation Results

The purpose for evaluating the physical habitat features of the selected locations within the Lost River watershed is to quantify the condition and quality of the instream and riparian habitat. The use of the Ohio EPA Qualitative Habitat Evaluation Index (QHEI) was used and is included in Appendix I. The summary of the QHEI habitat scoring technique from the 2004 surveys are provided in Table 6.

TABLE 6 – QHEI RESULTS FOR LOST RIVER, SEPTEMBER 8, 2004

	Relative Reference	Station 1	Station 2	Station 3	Station 4
Habitat Parameters					
Substrate	18	18*	14	17	12
Instream Cover	17	17*	16	16	15
Channel Morphology	11	11*	11*	11*	11*
Riparian Zone and Bank Erosion	4.5	4.5*	4.5*	4	4.5*
Pool/Current Quality	10	8	8	10*	8
Riffle/Run Quality	5	5*	3	4	4
Gradient	6	6*	6*	6*	6*
Total Score	71.5	69.5	62.5	68	60.5
Percent of Reference	100	97	87	95	85

* indicates highest quality, used as reference station.

5.3 Chemical Evaluation Results

V3 performed the sampling events on June 29 and 30, 2004 and January 5 and 6, 2005. The parameters included oxidation-reduction potential, temperature, conductivity, pH, dissolved oxygen, flow, and turbidity. Water quality data sheets for parameters taken in the field are included in Appendix I. V3 also collected water samples for water chemistry analysis in a laboratory for the following parameters: Ammonia, Nitrate, Nitrite, Total Kjeldahl (baseflow only), Dissolved Phosphorous, Total Phosphorous and *Escherichia coliform*. Results for the lab are included in Appendix IV. Table 7 shows the results of the baseflow data and Table 8 shows the results of the stormflow data.

TABLE 7 – SUMMARY OF BASEFLOW SAMPLING WATER QUALITY DATA FOR LOST RIVER, JUNE 29 AND 30, 2004

Parameter	Units	St. 1	St. 2	St. 3	St. 4	St. 6	St. 7	St. 9	St. 10
Nitrogen, Ammonia	mg/L	0.850	0.567	0.624	0.678	1.02	0.524	0.500	0.488
Nitrogen, Nitrate	mg/L	11.9	7.83	10.0	9.71	0.864	7.03	6.28	6.60
Nitrogen, Nitrite	mg/L	0.044	0.022	0.033	0.036	<0.010	0.013	0.014	0.017
Nitrogen, Total Kjeldahl	mg/L	1.68	0.980	0.840	1.12	1.40	0.980	0.700	0.840
Phosphorus, Dissolved	mg/L	0.033	0.038	0.028	0.020	0.054	0.062	0.064	0.062
Phosphorus, Total	mg/L	0.039	0.041	0.032	0.027	0.064	0.074	0.087	0.077
<i>Escherichia Coliform</i>	cfu/ 100ml	6,300	440	310	90	No sample	60	710	1,030
pH	-log [H ⁺]	7.82	8.08	7.96	7.70	7.30	7.36	7.47	7.58
Conductivity	umhos/cm	389	437	433	422	432	429	439	465
Air Temperature	°C	28.0	28.0	29.0	28.0	22.0	22.0	31.0	20.0
Water Temperature	°C	20.8	21.0	21.6	21.0	17.0	17.0	17.0	15.6
Dissolved Oxygen	mg/L	11.38	8.64	10.65	10.98	6.55	5.95	7.52	8.05
Dissolved Oxygen	% saturation	128%	96%	123%	122%	68%	61%	78%	82%
Turbidity	NTU	3.7	1.7	2.9	2.1	8.0	7.8	29.0	12.0
Flow Volume	Ft ³ /second	5.0	3.4	15.0	30.0	27.1	no reading	no reading	no reading
Date of Sampling	MM/DD	06/29	06/29	06/29	06/29	06/30	06/29	06/29	06/29
Time of Sampling	Military	08:30	08:40	08:50	09:10	10:30	10:00	10:20	11:10

TABLE 8 – SUMMARY OF STORMFLOW WATER QUALITY DATA FOR LOST RIVER, JANUARY 5 AND 6, 2005

Parameters	Units	St. 1	St. 2	St. 3	St. 4	St. 5	St. 7	St. 8	St. 9	St. 10
Nitrogen, Ammonia	mg/L	0.074	0.074	0.077	0.118	0.234	0.177	0.201	0.057	0.051
Nitrogen, Nitrate	mg/L	2.04	2.05	2.10	1.77	2.88	4.41	2.05	3.03	3.36
Nitrogen, Nitrite	mg/L	0.013	0.011	0.012	0.014	0.015	0.014	0.015	0.011	0.011
Phosphorus, Dissolved	mg/L	0.206	0.202	0.253	0.256	0.281	0.171	0.311	0.093	0.098
Phosphorus, Total	mg/L	0.270	0.263	0.326	0.364	0.467	0.289	0.537	0.165	0.177
<i>Escherichia Coliform</i>	cfu/ 100ml	690	1,600	2,400	2,700	4,800	2,000	5,000	2,800	940
pH	-log [H+]	6.92	6.83	6.90	7.14	6.92	6.82	7.14	6.73	6.75
Conductivity	umhos/cm	90.1	109.4	92.4	85.2	156.5	214.3	112.8	210.6	223.5
Air Temperature	°C	3.3	2.2	2.2	1.7	4.4	4.4	5.6	5	5.6
Water Temperature	°C	6.7	7.1	6.8	6.7	10.3	10.8	9.7	11.4	11.6
Dissolved Oxygen	mg/L	12.9	13.1	13.1	12.8	11.8	10.9	11.3	11.6	10.1
Dissolved Oxygen	% saturation	106	107	107	105	104	98	100	105	94
Turbidity	NTU	27	22	35	45	80	45	85	36	33
ORP	Ft ³ /second	208	208	194	185	213	259	174	224	230
Date of Readings	MM/DD	01/06	01/06	01/06	01/06	01/05	01/05	01/05	01/05	01/05
Time of Readings	Military	08:45	08:15	07:45	07:15	07:30	08:30	11:00	09:30	11:30

5.4 Field Review

V3 provided Orange County SWCD, LARE staff, as well as the representatives of interested volunteer water quality monitoring groups with advanced notification of the sampling dates. Representatives of these organizations were able to attend the sampling events and observe and learn the field data collection techniques. The biological sampling efforts were performed with Frank Hodges (IDNR) and Treva Brim (Orange County SWCD) in attendance. Additionally, Frank Hodges of the IDNR was in attendance during the baseflow and stormflow sampling efforts.

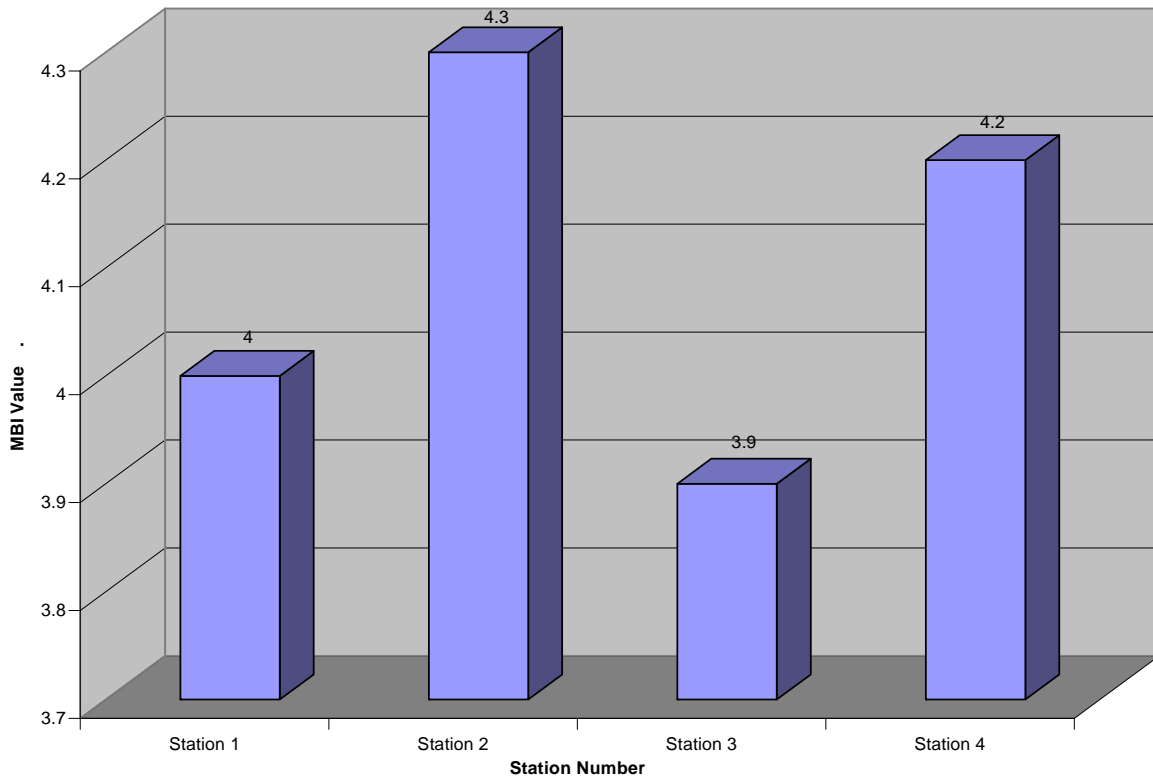
6.0 DISCUSSION

The macroinvertebrate community results demonstrate a very healthy richness measure at all four stations through the values of Total Number of Taxa. However, Stations 2 and 4 provide only 75% of the reference station's potential for EPT Taxa, and are considered Moderately Impaired by this metric. Total Number of EPT Taxa stands for the collective orders of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies). These three orders of insects are considered indicative of healthy macroinvertebrate communities and high water quality. Composition measures such as Percent Contribution of Dominant Taxa will decrease as water quality, habitat diversity and habitat suitability improve. Composition measures such as Ratio of EPT to Chironomidae (midges) reflects good biotic condition if the sensitive groups (EPT) demonstrate a substantial representation. However, if the Chironomidae have a disproportionately large number of individuals in comparison to the sensitive groups then this situation is indicative of environmental stress. Both Stations 2 and 3 resulted in a severely impaired biological condition for this metric, because the relative reference station has a high value due to the high value at Stations 1 and 4. Otherwise these values are typically representative of healthy biological communities on a regional scale.

Tolerance/Intolerance measures are intended to be representative of relative sensitivity to perturbation. The Hilsenhoff Biotic Index developed in 1982 is oriented towards the detection of organic pollution but is generally not specific to the type of stressor. The Modified Biotic Index (MBI) was also developed to detect organic pollution and is based on the original species level index developed by Hilsenhoff. Pollution tolerance values range from 0 to 10 and increase as water quality decreases. The lower the MBI, the greater the number of pollution intolerant species (see Exhibit V).

All four of the stations demonstrate a very health tolerance/intolerance measure. The evaluation of Functional Feeding Groups through the ratio of scraper to filtering collector reflects the riffle/run community food base. Filtering collectors are sensitive to toxicants bound to fine particles and should be the first group to decrease when exposed to steady sources of such toxicants. Station 1 demonstrated severely impaired biological condition and Station 3 demonstrates moderately impaired values for this metric. The ratio of shredders to nonshredders through the CPOM evaluation demonstrates the riparian zone impacts from the toxicants that are readily adsorbed into the plant parts within the CPOM. Stations 1, 2 and 3 all showed severe impairment through this evaluation metric.

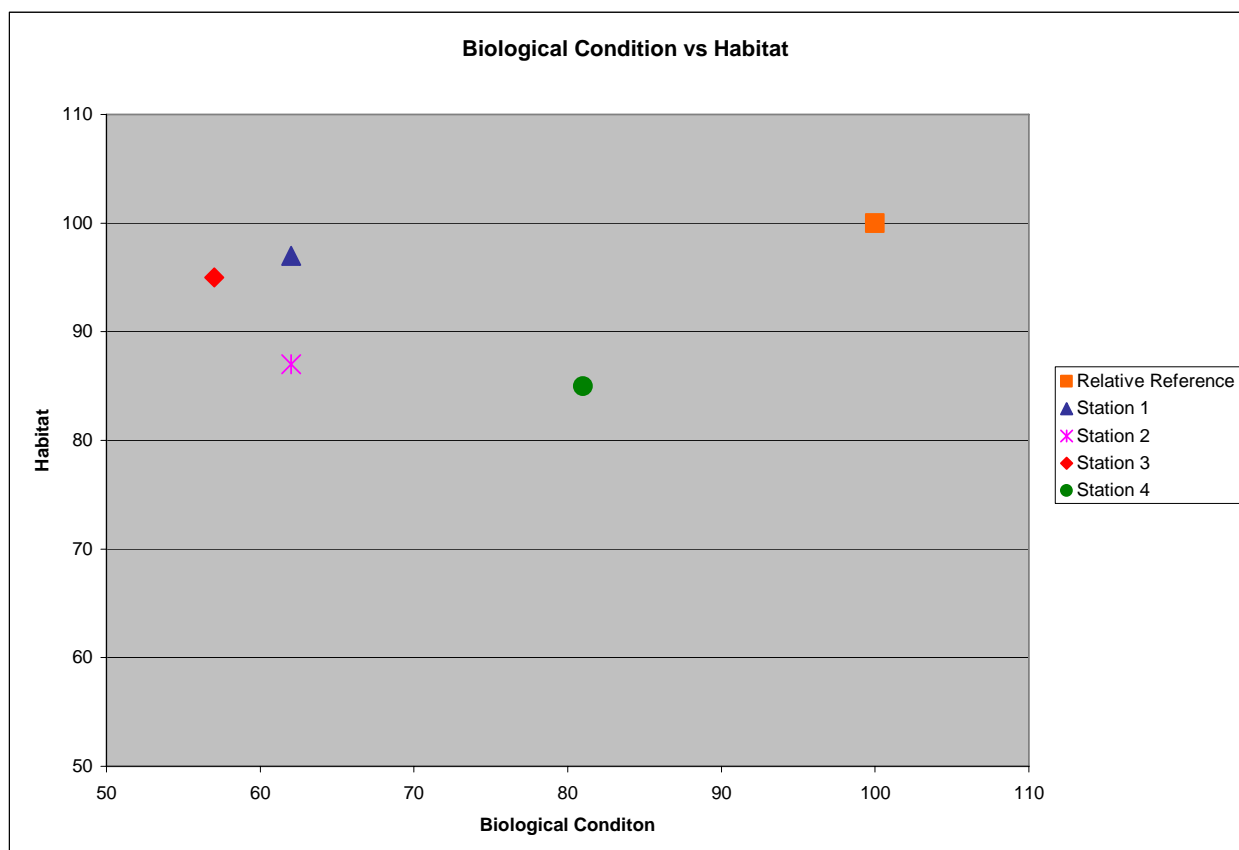
EXHIBIT V – MODIFIED BIOTIC INDEX (MBI) FROM BIOLOGICAL CONDITION, SEPTEMBER 2004



Habitat incorporates all aspects of physical and chemical constituents along with the biotic interactions. Habitat includes all of the instream and riparian habitat that influences the structure and function of the aquatic community in a stream. The presence of an altered habitat structure is considered one of the major stressors of aquatic systems. The presence of degraded habitat can sometimes obscure investigations on the effects of toxicity and/or pollution. The Ohio EPA QHEI total score values are classified within four quality categories: Excellent = 76 to 100, Good = 51 to 75, Fair = 26 to 50, Poor = 0 to 25. All four of the sampling stations evaluated for habitat during the Lost River Watershed Final Water Quality Monitoring Study resulted in Good habitat ratings.

Exhibit VI graphically displays comparisons of each of the four stations to the relative reference station. The reference station is normalized at 100% of the habitat scoring and 100% of the biological condition. This represents the achievable potential of each sampling station. The biological data source for this graph can be found on Table 5, the habitat data source can be found on Table 6.

EXHIBIT VI – PERCENTAGE OF REPRESENTATIVE REFERENCE STATION FOR BIOLOGICAL CONDITION AND HABITAT, SEPTEMBER 2004



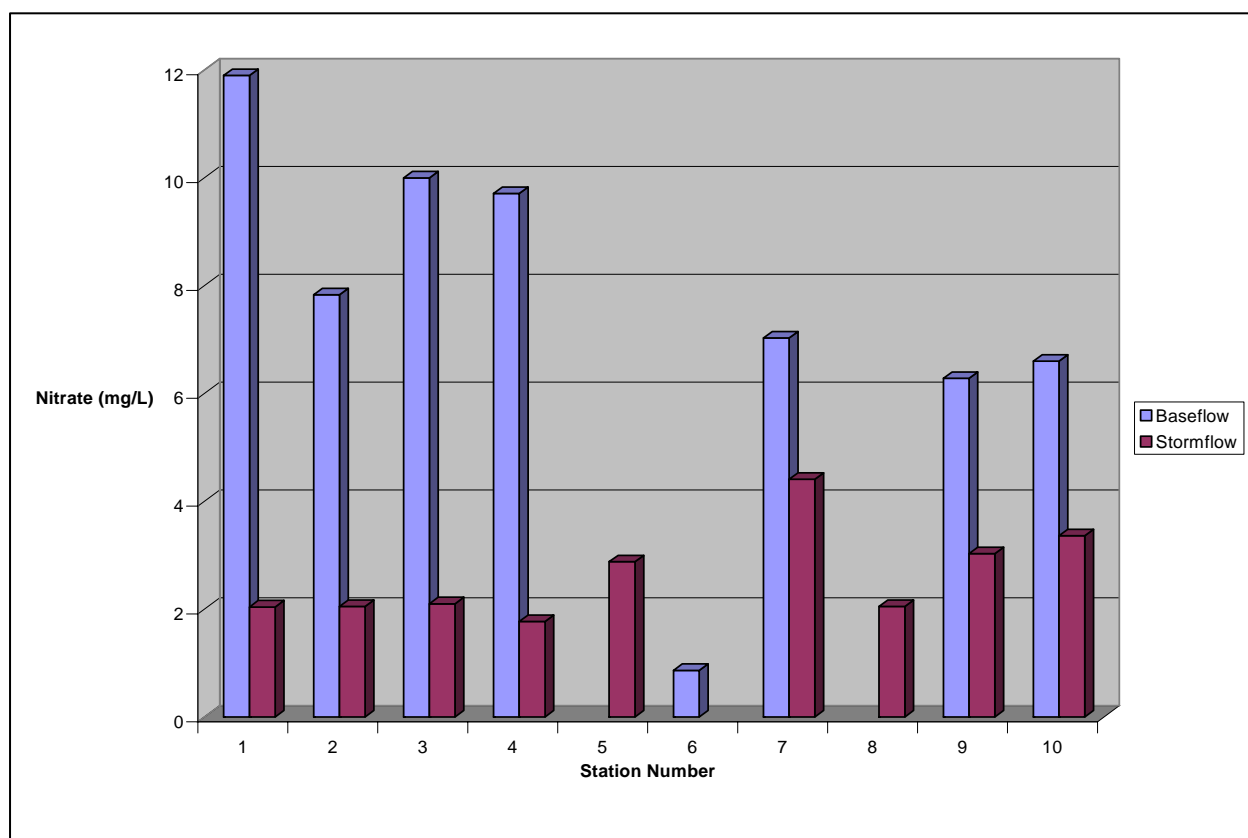
The relative reference stream represents regional expectations with 100 for both habitat and biological condition. Station 1 and 3 are both comparable to the reference for habitat and are both slightly impaired for biological condition. Stations 2 and 4 are both supporting for habitat and slightly impaired for biological condition. The relationship between habitat quality and biological condition demonstrates that good quality habitat will support high quality biological communities, and responses to minor alterations in habitat will be subtle and of little consequence. Discernible biological impairment results as habitat quality continues to decline.

In areas of good or excellent habitat, biological communities will reflect degraded conditions when water quality effects are present. This graph demonstrates a condition where organic pollution or toxicants will adversely affect biological condition regardless of the quality of the habitat.

Phosphorus levels are high at 1,2,3,4,5,7,8,9 and 10 during stormflow sampling in January 2005 and at 1,2,3,6,7,9 and 10 during baseflow sampling in June 2004. The only station sampled that was not over the 0.03 mg/L level which can cause algal blooms was Station 4 during baseflow and the value (0.027 mg/L) was just barely below that level (Vollenweider 1968, Wetzel 1975).

Nitrate (NO_3) generally occurs in trace quantities in surface water but may attain high levels in some groundwater. In excessive amount, it contributes to the illness known as methemoglobinemia in infants. A limit of 10 mg/L has been imposed on drinking water to prevent this disorder. Stations 1 and 3 during the June 2004 sampling effort had reached these high levels, shown in Exhibit VII.

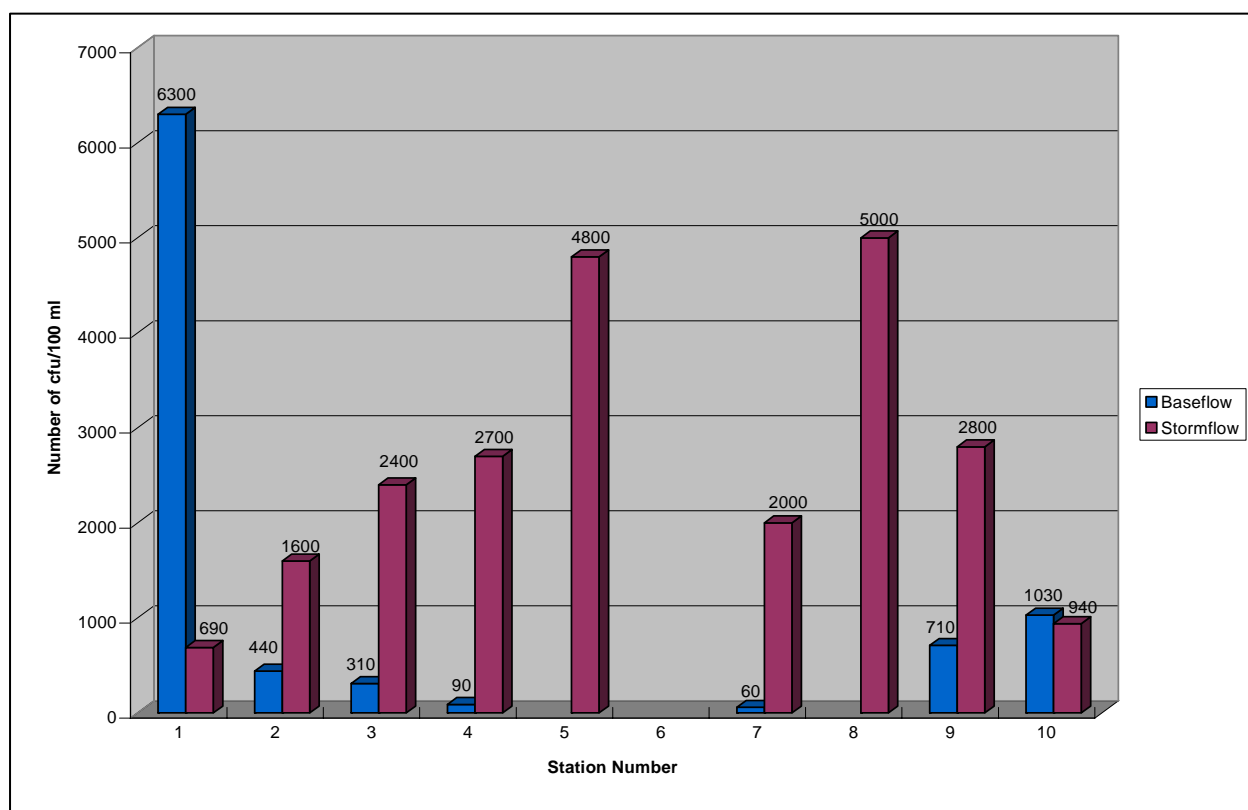
EXHIBIT VII – AMOUNT OF NITRATE IN MG/L FROM BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005.



Escherichia coli, know as *E coli*, is a member of the fecal coliform group of bacteria. When this organism is detected within water samples, it is an indication of fecal contamination. *E coli* is an indigenous fecal flora of warm-blooded animals. Contributions of detectable *E coli* colonies may appear within water samples due to the input from human or animal waste. The state standard in Indiana for *E coli* is 235 cfu/100mL. The measure of cfu per 100 mL means the

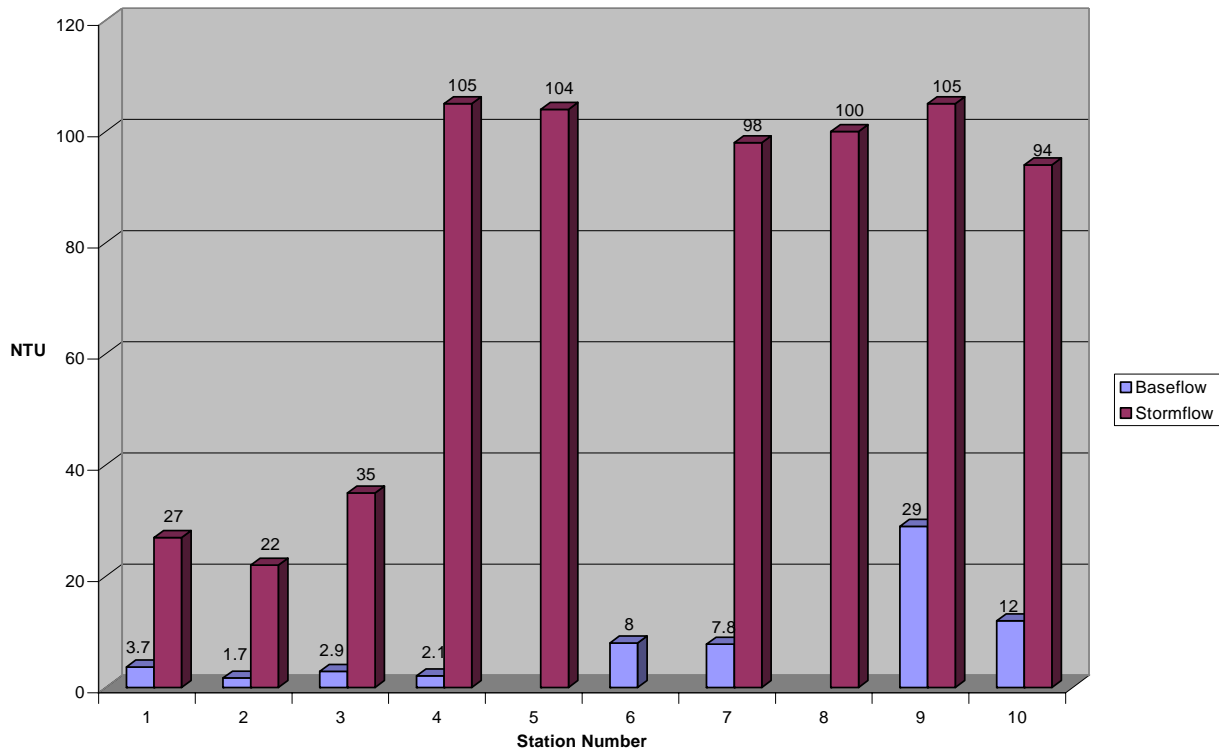
count of colony forming units that exist in 100 milliliters of water. All stations analyzed during the stormflow sampling of January 2005 tested much higher than level, including Stations: 1,2,3,4,5,7,8,9 and 10. Five of the seven stations analyzed during the baseflow sampling effort of June 2004 tested higher than this level, including Stations: 1, 2, 3, 9 and 10. The only two stations that were below this level were Stations 4 and 7. *E. coli* counts are shown by station in Exhibit VIII. The most contaminated location was Station 1, the upstream most station on South Fork Lost River, where the concentration of *E. coli* (6,300 cfu/100ml) was more than six times that of any other station analyzed during the baseflow sampling effort.

EXHIBIT VIII – NUMBER OF COLONY FORMING UNITS (CFU) OF *E. COLI* IN BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005.



Interestingly, the stations with the highest levels of *E. coli* were both drybed sampling stations, Stations 5 (4,800 cfu/100ml) and Station 8 (5,000 cfu/100ml). These two stations also shared the highest turbidity levels, Station 5 (80 NTU) and Station 8 (85 NTU). Turbidity values by station are shown in Exhibit IX. Perhaps this was due to the higher concentrations of bacteria and fine particles building up in these typically dry riverbeds and the stormevent carrying a plume through these reaches that otherwise would not be at these heightened levels under perennial flow conditions.

EXHIBIT IX – TURBIDITY VALUES IN NTU’S FOR BOTH BASEFLOW AND STORMFLOW SAMPLING EFFORTS, JUNE 2004 AND JANUARY 2005.



Indiana Department of Environmental Management (IDEM) has performed sampling of macroinvertebrates, habitat and water quality at four sites (Carters Creek was sampled twice at the same location) within the Lost River Watershed from 1993 to 2002 (see Table 9). Of the four stations, two of these are identical to locations sampled during V3's study. Direct correlation with IDEM data is limited as different collection methods were used in each study for macroinvertebrates. Kick samples and Hester/Dendy samples were collected for the IDEM sites while multi habitat kick net samples were taken in the V3 study. Alternative seasons were used for several of the IDEM samples, so it would be difficult to compare as the biological community changes depending on the time of year. Also as many as 352 individual macroinvertebrates were identified in the IDEM sample, while the protocol that V3 followed limited the samples to 100 individuals. This discrepancy could affect value interpretation to a significant degree. However, it is important to note from the IDEM data that the Lost River's macroinvertebrate results demonstrate healthy communities. While the QHEI data is more directly comparable there were different categories and different scales for the categories that were used from 1993 to 2004. In the IDEM data, habitat also demonstrated high quality conditions. The water quality parameters were limited to Water Temperature, Dissolved Oxygen, pH and Specific Conductance (see Table 10). No interpretive conclusion can be drawn from comparing IDEM's data to V3's data. It should be noted that all of the water quality parameters, although representing a unique karst river system, are within regionally acceptable levels as compared to values throughout the state (DJ Case 2005).

TABLE 9 – BENTHIC MACROINVERTEBRATE AND HABITAT RESULTS FROM IDEM

Stream Name	Station ID	Location	Sample Date	QHEI	HBI
Lost River	WEL150-0007	425 N	8/6/02	70	4.45
Lost River	WEL150-0005	Tater Rd.	10/28/93	87	4.3
Carters Creek	WEL150-0006	Tater Rd.	11/2/93	89	3.97
South Fork Lost River	WEL150-0004	CR 350 N	11/2/93	85	4.67
Carters Creek	WEL150-0006	Tater Rd.	8/27/97	80	4.57

TABLE 10 – WATER QUALITY RESULTS FROM IDEM

Waterway	Station ID	Location	Sample Date	Water Temp. (°C)	Dissolved Oxygen (mg/L)	pH (-log [H+])	Turbidity (NTU)	Specific Conductance (umhos/cm)
Lost River	WEL150-0005	Tater Rd.	10/28/93	10.4	10.51	7.96	-	580
Carters Creek	WEL150-0006	Tater Rd.	11/2/93	6.46	10.23	7.96	-	587
South Fork Lost River	WEL150-0004	CR 350 N	11/2/93	5.98	11.53	8.27	-	539
Carters Creek	WEL150-0006	Tater Rd.	8/27/97	22.25	7.93	8.47	-	483
Lost River	WEL150-0001	Tater Rd.	7/10/97	24.26	7.65	7.98	94.09	112
Lost River	WEL150-0001	Tater Rd.	6/11/97	16.68	9.26	7.69	11.3	401
Lost River	WEL150-0001	Tater Rd.	4/30/97	13.1	9.75	7.92	6.09	403
Lost River	WEL150-0001	Tater Rd.	3/18/97	8.96	10.37	7.76	257	331
Lost River	WEL150-0001	Tater Rd.	9/22/97	19.38	10.44	8.07	4.8	464
Lost River	WEL150-0001	Tater Rd.	12/2/97	6.9	11.44	8.03	37.4	471
South Fork Lost River	WEL150-0008	Vernon School Rd.	9/9/97	19.56	6.44	7.82	23.39	420
Lost River	WEL150-0007	425 N.	7/30/02	23.27	4.35	7.01	7.8	472
Lost River	WEL150-0007	425 N.	9/18/02	20.05	7.65	7.69	5.69	468
Lost River	WEL150-0007	425 N	8/6/02	24.75	8.65	7.53	13	461
Lost River	WEL150-0007	425 N.	6/26/02	23.79	10.62	8.68	8.5	449
Lost River	WEL150-0003	E of 337	8/14/02	24.26	7.7	7.98	8.35	412
Lost River	WEL150-0003	E of 337	7/30/02	28.29	8.06	7.98	4.36	448
Lost River	WEL150-0003	E of 337	8/6/02	28.43	8.33	8.07	5.48	441
Lost River	WEL150-0003	E of 337	8/20/02	25.85	8.97	8.05	6.94	426
Lost River	WEL150-0003	E of 337	8/27/02	25.67	9.45	8.06	6.17	405

From 1996 to 2002 IDEM collected four (three are in the study area) fish tissue samples to evaluate for contaminants on the Lost River (see Appendix V). The study summary results have been included in this report as an Appendix, but no analytical interpretation is provided. The data is up to ten years old and watershed conditions may have changed. There was also two fish surveys that were completed. One was on the South Fork Lost River (1997) and the other was on the Lost River (2002). This data is included in Appendix V. Additionally, limited water chemistry data from inorganic, organic and metal analysis was performed for 6 samples from 2002, for the following parameters: Alkalinity, CBOD5, Chloride, COD, Coliforms, Cyanide, *E. coli*, Hardness, Nitrate+Nitrite, Total Phosphorous, Sulfate, TDS, TKN, TOC, TS, TSS, Aluminum, Arsenic, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Sodium and Zinc.

7.0 SUMMARY AND RECOMMENDATIONS

V3 Companies, Ltd (V3) has conducted the Lost River Watershed Final Water Quality Monitoring Study for the Orange County Soil and Water Conservation District (SWCD). Exhibit I shows the Project Vicinity. There are ten sampling stations for evaluating the biological, physical and chemical condition of the watershed including: macroinvertebrate communities, in-stream and riparian habitat and water quality parameters. The watershed of the Lost River is within the karst regions surrounding Paoli, Indiana. The Lost River watershed evaluated during this study is 106,980 acres. The portion of the river evaluated during this study has a linear river length of approximately 15.3 miles for perennial surface water in the upstream reaches, approximately 21.3 miles of linear length for intermittent drybeds, an estimated 7.5 miles of linear length for underground river systems, and another perennial surface water stream segment of approximately 25.8 miles for linear length in the downstream reaches.

Prior to the implementation of the best management practices, there was no baseline study performed to establish the conditions of water quality, macroinvertebrate communities and habitat. The study performed by V3 in 2004 and 2005 will provide information on existing conditions for future comparisons, however, it does not allow for any current interpretation on the watershed's benefits from the implementation of these conservation practices.

The evaluation of macroinvertebrate communities within the watershed describe the biological health at a level which provides insight into point and nonpoint source impacts which otherwise may or may not be able to be measured. The four upstream most stations were the only stations evaluated for macroinvertebrates, as the other stations were unsuitable for the collection effort due to dryness, depth or lack of habitat. All four of the stations possess a slightly impaired biological condition.

Habitat incorporates all aspects of physical and chemical constituents along with the biotic interactions. Habitat includes all of the instream and riparian habitat that influences the structure and function of the aquatic community in a stream. The presence of an altered habitat structure is considered one of the major stressors of aquatic systems. The presence of degraded habitat can sometimes obscure investigations on the effects of toxicity and/or pollution. All four of the sampling stations evaluated for habitat during the Lost River Watershed Final Water Quality Monitoring Study resulted in Good habitat ratings.

Water quality analysis of the watershed during baseflow and stormflow events showed acceptable values with the following exceptions. Phosphorus levels were high at 1,2,3,4,5,7,8,9 and 10 during stormflow sampling in January 2005 and at 1,2,3,6,7,9 and 10 during baseflow sampling in June 2004. The only station sampled that was not over the 0.03 mg/L level which can cause algal blooms was Station 4. This may be a result of the extensive winter cover locations implemented through the land use conservation best management practices program. Please see Exhibit III for the significant portions of the land surrounding Lost River upstream of Station 4 which participated in this program. It is likely that the cover crop provided the necessary filtration and buffer to prevent the higher levels of phosphorus within the mainstem of the Lost River.

Nitrate was measured at high levels at both Stations 1 and 3 during the June 2004 sampling effort. Since Station 3 is immediately downstream of Station 1, it is assumed that the nitrate source is coming from the South Fork of Lost River and not from the headwaters of Carter Creek. It is recommended that more focus be placed on implementing additional land use conservation best management practices along the Orange County and Washington County agricultural lands surrounding the South Fork of Lost River.

The stations with the highest levels of *E coli* were baseflow conditions at Station 1 (6,300 cfu/100ml) along the South Fork Lost River and stormflow condition at both drybed sampling stations along Lost River, Stations 5 (4,800 cfu/100ml) and Station 8 (5,000 cfu/100ml). Stations 5 and 8 also shared the highest turbidity levels, Station 5 (80 NTU) and Station 8 (85 NTU). Perhaps this was due to the higher concentrations of bacteria and fine particles building up in these typically dry riverbeds and the stormevent carrying a plum through these reaches that otherwise would not be at these heightened levels under perennial flow conditions.

In areas of good or excellent habitat, biological communities will reflect degraded conditions when water quality effects are present. This graph demonstrates a condition where organic pollution or toxicants will adversely affect biological condition regardless of the quality of the habitat.

Land use best management conservation practices were implemented by the Orange County SWCD's to improve the Lost River watershed from 2001 through 2005. The land use best management conservation practices included: winter cover crop, heavy use area feeding pads, spring development, and pasture/hayland plantings. The best management land use conservation practices implemented by the Orange County SWCD to improve the Lost River watershed were all located within rural agricultural areas.

This report recommends that further implementation of land use best management practices continue to be implemented to prevent degradation to macroinvertebrate communities, habitat and water quality within this unique river system. Specific water quality improvements in bacteria, nitrogen as nitrates, and turbidity are warranted. This report recommends taking further measures to install additional winter cover crops, heavy use area feeding pads and pasture/hayland plantings. Along with the addition of no-till conservation tillage, stormwater runoff diversions, cool season grass filter strips, pipe structure grade stabilization structures, rock rip-rap grade stabilization structures, grass waterways, tree plantings, waste management containment systems, and water and sediment control basins.

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APPENDIX I:

V3 COMPANIES FIELD DATA SHEETS

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

page of

STREAM NAME <u>Lost River</u>		LOCATION <u>CR 350 N</u>
STATION # <u>1</u>	RIVERMILE <u> </u>	STREAM CLASS <u> </u>
LAT <u> </u>	LONG <u> </u>	RIVER BASIN <u> </u>
STORET # <u> </u>		AGENCY <u> </u>
COLLECTED BY <u>ESB, WGL</u>	DATE <u>9/9/04</u>	LOT # <u> </u>
TAXONOMIST <u>WGL</u>	DATE <u>11/3/05</u>	SUBSAMPLE TARGET <input checked="" type="checkbox"/> 100 <input type="checkbox"/> 200 <input type="checkbox"/> 300 <input type="checkbox"/> Other <u> </u>

Enter Family and/or Genus and Species name on blank line.

[illegible]

Taxonomic certainty rating (TCR) 1-5: 1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I=immature; P=pupa; A=adult TI=Taxonomists initials

Total No. Organisms 100

Total No. Taxa 19

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

South Fork

STREAM NAME <u>Lost River</u>	LOCATION	
STATION # <u>1</u> RIVERMILE	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS <u>ESB, ULL</u>	LOT NUMBER	
FORM COMPLETED BY <u>ESB</u>	DATE <u>9/9/04</u> TIME <u>10:00</u> AM PM	REASON FOR SURVEY

HABITAT TYPES	Indicate the percentage of each habitat type present <input checked="" type="checkbox"/> Cobble <u>10</u> % <input checked="" type="checkbox"/> Snags <u>8</u> % <input checked="" type="checkbox"/> Vegetated Banks <u>2</u> % <input checked="" type="checkbox"/> Sand <u>5</u> % <input checked="" type="checkbox"/> Submerged Macrophytes <u>2</u> % <input type="checkbox"/> Other () %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jabs/kicks taken in each habitat type. <input checked="" type="checkbox"/> Cobble <u>3</u> <input checked="" type="checkbox"/> Snags <u>3</u> <input checked="" type="checkbox"/> Vegetated Banks <u>3</u> <input checked="" type="checkbox"/> Sand <u>3</u> <input checked="" type="checkbox"/> Submerged Macrophytes <u>2</u> <input type="checkbox"/> Other ()
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	(2)	3	4	Slimes	(0)	1	2	3	4
Filamentous Algae	0	(1)	2	3	4	Macroinvertebrates	0	1	2	(3)	4
Macrophytes	0	1	(2)	3	4	Fish	0	1	(2)	3	4

Rock bass - 1
Banded Scalpin - 1

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>South Fork Lost R. Va.</u>		LOCATION <u>CR 356 N</u>
STATION # <u>1</u> RIVERMILE _____		STREAM CLASS _____
LAT _____ LONG _____		RIVER BASIN _____
STORET # _____		AGENCY _____
INVESTIGATORS <u>EJB, WGL</u>		
FORM COMPLETED BY <u>WGL</u>		DATE <u>9/9/01</u> TIME <u>6:00</u> <input checked="" type="radio"/> AM <input type="radio"/> PM
REASON FOR SURVEY _____		

WEATHER CONDITIONS	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input checked="" type="checkbox"/> %cloud cover <u>15</u> <input checked="" type="checkbox"/> clear/sunny </td> <td style="width: 50%;"> Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/> </td> </tr> <tr> <td colspan="2"> Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____ </td> </tr> </table>	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input checked="" type="checkbox"/> %cloud cover <u>15</u> <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____	
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Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____					
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="height: 400px; border: 1px solid black;"></div>				
STREAM CHARACTERIZATION	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____ </td> <td style="width: 50%;"> Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km² </td> </tr> </table>	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km ²		
Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km ²				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(BACK)

Lost River
Station 1
9/9/04

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential		Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____		
INSTREAM FEATURES	Estimated Reach Length <u>90</u> m Estimated Stream Width <u>9</u> m Sampling Reach Area <u>720</u> m ² Area in km ² (m ² x1000) _____ km ² Estimated Stream Depth <u>3.5</u> m Surface Velocity _____ m/sec Canopy Cover <input checked="" type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark <u>1.6</u> m Proportion of Reach Represented by Stream Morphology Types <input checked="" type="checkbox"/> Riffle <u>20</u> % <input checked="" type="checkbox"/> Run <u>50</u> % <input checked="" type="checkbox"/> Pool <u>30</u> % Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No <i>recovery</i> Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
LARGE WOODY DEBRIS	LWD <u>3</u> m ³ Density of LWD _____ m ³ /km ² (LWD/ reach area)		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input checked="" type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>5</u> %		
WATER QUALITY	Temperature <u>65.0</u> °F Specific Conductance <u>410.9</u> µmhos Dissolved Oxygen <u>9.32</u> mg/L pH <u>7.45</u> Turbidity <u>3.3</u> WQ Instrument Used <u>Troll 9000</u> <u>ORP = 350</u> Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____		
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

River Code: Site 4 RM: Stream: South Fork Lost RiverDate: 9/9/04 Location: Site 1Scorers Full Name: Ed Belmonte Affiliation: V3

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE	POOL RIFFLE	POOL RIFFLE	SUBSTRATE ORIGIN	SUBSTRATE QUALITY	
<input type="checkbox"/> BLDR /SLBS [10]	<input checked="" type="checkbox"/> GRAVEL [7]	Check ONE (OR 2 & AVERAGE)	Check ONE (OR 2 & AVERAGE)		Substrate 18 Max 20
<input checked="" type="checkbox"/> BOULDER [9]	<input type="checkbox"/> SAND [6]	<input type="checkbox"/> LIMESTONE [1]	SILT:	<input type="checkbox"/> SILT HEAVY [-2]	
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/> TILLS [1]		<input type="checkbox"/> SILT MODERATE [-1]	
<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/> WETLANDS [0]		<input checked="" type="checkbox"/> SILT NORMAL [0]	
<input type="checkbox"/> MUCK [2]	<input type="checkbox"/> ARTIFICIAL [0]	<input checked="" type="checkbox"/> HARDPAN [0]		<input type="checkbox"/> SILT FREE [1]	
<input type="checkbox"/> SILT [2]	NOTE: Ignore Sludge Originating From Point Sources		<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> EXTENSIVE [-2]	
		<input type="checkbox"/> RIP/RAP [0]	NESS:	<input checked="" type="checkbox"/> MODERATE [-1]	
		<input type="checkbox"/> LACUSTRINE [0]		<input checked="" type="checkbox"/> NORMAL [0]	
		<input type="checkbox"/> SHALE [-1]		<input type="checkbox"/> NONE [1]	
		<input type="checkbox"/> COAL FINES [-2]			

NUMBER OF SUBSTRATE TYPES: ☒ 4 or More [2] ☐ 3 or Less [0]

COMMENTS: _____

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure)	TYPE: Score All That Occur	AMOUNT: (Check ONLY One or check 2 and AVERAGE)	Cover
<input checked="" type="checkbox"/> UNDERLIT BANKS [1]	<input checked="" type="checkbox"/> POOLS > 70 cm [2]	<input type="checkbox"/> EXTENSIVE > 75% [11]	17 Max 20
<input checked="" type="checkbox"/> OVERHANGING VEGETATION [1]	<input checked="" type="checkbox"/> ROOTWADS [1]	<input checked="" type="checkbox"/> MODERATE 25-75% [7]	
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input checked="" type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> SPARSE 5-25% [3]	
<input checked="" type="checkbox"/> ROOTMATS [1]		<input type="checkbox"/> NEARLY ABSENT < 5% [1]	

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	Channel
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]	<input type="checkbox"/> SNAGGING	11 Max 20
<input checked="" type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> RELOCATION	
<input type="checkbox"/> LOW [2]	<input checked="" type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]	<input type="checkbox"/> CANOPY REMOVAL	
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]		<input type="checkbox"/> DREDGING	
				<input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH		FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)		BANK EROSION		Riparian
L R (Per Bank)	L R (Most Predominant Per Bank)	L R	L R (Per Bank)			4.5 Max 10
<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> CONSERVATION TILLAGE [1]	<input checked="" type="checkbox"/> NONE/LITTLE [3]			
<input checked="" type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]	<input checked="" type="checkbox"/> MODERATE [2]			
<input type="checkbox"/> NARROW 5-10 m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input type="checkbox"/> OPEN PASTURE, ROWCROP [0]	<input checked="" type="checkbox"/> HEAVY/SEVERE [1]			
<input checked="" type="checkbox"/> VERY NARROW < 5 m [1]	<input checked="" type="checkbox"/> FENCED PASTURE [1]	<input type="checkbox"/> MINING/CONSTRUCTION [0]				

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH	MORPHOLOGY	CURRENT VELOCITY	POOLS & RIFFLES!	Pool/Current
(Check 1 ONLY!)	(Check 1 or 2 & AVERAGE)	(Check All That Apply)		8 Max 12
<input type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> EDDIES [1]	<input type="checkbox"/> TORRENTIAL [-1]	
<input checked="" type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]	
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]	<input checked="" type="checkbox"/> MODERATE [1]	<input type="checkbox"/> INTERMITTENT [-2]	
<input type="checkbox"/> 0.2-0.4m [1]		<input checked="" type="checkbox"/> SLOW [1]	<input type="checkbox"/> VERY FAST [1]	
<input type="checkbox"/> < 0.2m [POOL=0]	COMMENTS: _____			

CHECK ONE OR CHECK 2 AND AVERAGE				Riffle/Run
RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS	5 Max 8 Gradient
<input checked="" type="checkbox"/> Best Areas > 10 cm [2]	<input type="checkbox"/> MAX > 50 [2]	<input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]	
<input checked="" type="checkbox"/> Best Areas 5-10 cm [1]	<input checked="" type="checkbox"/> MAX < 50 [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input checked="" type="checkbox"/> LOW [1]	
<input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0]		<input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]	
		<input type="checkbox"/> NO RIFFLE [Metric=0]	<input type="checkbox"/> EXTENSIVE [-1]	6 Max 10

COMMENTS: _____

6) GRADIENT (ft/mi): _____ DRAINAGE AREA (sq.mi.): _____

%POOL: 30 %GLIDE: —%RIFFLE: 20 %RUN: 50

* Best areas must be large enough to support a population of riffle-obligate species

Macrobenthos Qualitative Sample List

Vial #

ORDER	FAMILY	GENUS	SPECIES	COUNT	TOLERANCE VALUES	FBI	
Nematomorpha						0.000	Parasite
Hydracarina- Trembidiformes						0.000	Predators/Parasite
13 Tubellaria	Planaria			1	4	0.047	Omnivore
Porifera	Spongiidae					0.000	Filters
25 Pelecypoda	Unionidae	Villosa	iris			0.000	Filters
	Corbiculidae	Corbicula	fluminea		3.2	0.000	Filters
	Sphaeriidae				8	0.000	Filters
	Dreissenidae	Dreissena	polymorpha			0.000	Filters
Gastropoda	Ancylidae				6	0.000	Scrapers
	Lymnaeidae				6.9	0.000	Scrapers
6	Lymnaeidae	Fossaria			2.6	0.000	Scrapers
	Physidae			1	8	0.094	Scrapers
	Physidae	Physella			8	0.000	Scrapers
29	Planorbidae				7	0.000	Scrapers
	Planorbidae	Planorbula			7	0.000	Scrapers
7	Pleuroceridae			13		0.000	Scrapers
	Bithyniidae	Bithynia	tentaculata			0.000	Scrapers
31 Annelida	Oligochaeta					0.000	Gatherers
	Hirudinea				10	0.000	Gatherers
32				1	8	0.094	Predators
20 Amphipoda					4	0.000	Shredders
32 Isopoda	Asellidae				8	0.000	Shredders
Ostracoda					8	0.000	Scavengers
Ephemeroptera	Caenidae	Caenis			7	0.000	Gatherers
	Ephemeridae	Hexagenia			3.1	0.000	Gatherers
11	Baetidae			25	4	1.176	Gatherers
	Baetidae	Baetis			3.1	0.000	Gatherers
	Baetidae	Baetis	brunneicolor		4	0.000	Gatherers
	Baetidae	Baetis	intercalaris		2.7	0.000	Gatherers
	Baetidae	Callibaetis			5.6	0.000	Gatherers
21	Heptageniidae	Stenacron			3.1	0.000	Scrapers
	Heptageniidae	Stenacron	glidersleevei		3.1	0.000	Scrapers
9	Heptageniidae	Stenonema		16	4	0.753	Scrapers
	Heptageniidae	Stenonema	exiguum		1.9	0.000	Scrapers
	Siphonuridae				7	0.000	Gatherers
	Ephemeriidae	Timpanoga			1	0.000	Gatherers
	Leptophlebiidae				2	0.000	Gatherers
	Leptophlebiidae	Tricorythodes			2.7	0.000	Gatherers
10	Isonychidae	Isonychia		1	2	0.024	Filters
Coleoptera	Dytiscidae				5	0.000	Predators
	Gyrinidae				5	0.000	Predators
	Gyrinidae	Dineutus			3.7	0.000	Predators
22	Helophidae				7	0.000	Predators
	Dryopidae				5	0.000	Predators
23,24	Elmidae				4	0.000	Gatherers
12	Psephenidae	Psephenus		4	4	0.188	Scrapers
	Hydrophilidae					0.000	Gatherers
14	Hydrophilidae	Tropisternus				0.000	Gatherers
	Corydalidae	Corydalus		1	4	0.047	Predators
15	Corydalidae	Nigronia			4	0.000	Predators
	Sialidae				4	0.000	Predators
Trichoptera	Brachycentridae	Brachycentrus			1	0.000	Filters
17	Helicopsychidae	Helicopsyche		1	3	0.035	Scrapers
	Helicopsychidae	Helicopsyche	borealis		3	0.000	Scrapers
27	Hydropsychidae			11	4	0.518	Filters
	Hydropsychidae	Hydropsyche			4	0.000	Filters
	Hydropsychidae	Hydropsyche	betheni		4	0.000	Filters
	Hydropsychidae	Hydropsyche	scalaris		4	0.000	Filters
	Hydropsychidae	Symphlopsyche			4	0.000	Filters
	Hydroptilidae				4	0.000	Gatherers
	Hydroptilidae	Hydroptila			3.2	0.000	Gatherers
	Leptoceridae				4	0.000	Shredders
	Leptoceridae	Nectopsyche			4	0.000	Shredders
	Molannidae				6	0.000	Gatherers
26	Odontoceridae				0	0.000	
	Philopotamidae				3	0.000	Filters
33	Philopotamidae	Chimarra		2	4	0.094	Filters
	Phryganeidae	Hagenella			4	0.000	Shredders
	Polychaetopodidae	Cymellus			6	0.000	Filters
	Psychomyiidae	Lype			2	0.000	Gatherers
30	Hemiptera	Belostomatidae				0.000	Predators
	Belostomatidae	Belostoma				0.000	Predators
	Corixidae				10	0.000	Predators
5	Gerridae			1	5	0.059	Predators
	Gerridae	Trepobates			5	0.000	Predators
	Nepidae					0.000	Predators
	Nepidae	Ranatra				0.000	Predators
	Notonectidae	Notonecta				0.000	Predators
4	Velidae	Rhagovelia		2		0.000	Predators
Plecoptera	Chloroperlidae				1	0.000	Predators
	Perlidae	Perlesta			1	0.000	Predators
	Perlidae	Neoperla			1	0.000	Predators
8	Perlidae	Classenia		1	1	0.012	Predators
1	Odonata-Anisoptera	Aeshnidae		3	3	0.106	Predators
	Aeshnidae	Boyeria			3	0.000	Predators
	Gomphidae				1	0.000	Predators
	Cordulegastriidae				3	0.000	Predators
28	Cordulidae				5	0.000	Predators
	Libellulidae				9	0.000	Predators
Odonata-Zygoptera	Calopterygidae				5	0.000	Predators
2	Calopterygidae	Calopteryx		14	3.7	0.609	Predators
	Coenagrionidae				6.1	0.000	Predators
19	Coenagrionidae	Argia			5.1	0.000	Predators
	Coenagrionidae	Engallagma			9	0.000	Predators
	Leptidae				9	0.000	Predators
Diptera	Ceratopogonidae				5.7	0.000	Gatherers
35	Blood-red Chironomidae				8.1	0.000	Gatherers
16	Other Chironomidae			1	6	0.071	Gatherers
18	Culicidae			1	8	0.094	Shredders
	Simuliidae				6	0.000	Filters
34	Tipulidae				3	0.000	Predators
	Stratiomyidae				8	0.000	Gatherers
	Tabanidae				6	0.000	Predators

TAXA RICHNESS 19
 FBI 4.021
 Scraper/Filter 2.500
 EPT/Chironomidae 57.000
 % Contribution of Dominant Taxa 0.250
 EPT Index 7.000
 Community Similarity Indices 0.000
 CPOM 1.000
 Total Number Collected 100

Comm. Loss = 0
 Jaccard Coef. = 1

total shredders 1

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

page of

STREAM NAME <u>Carter Creek at Tater Rd</u>	LOCATION <u>Tater Road</u>
STATION # <u>2</u> RIVERMILE	STREAM CLASS
LAT LONG	RIVER BASIN
STORET #	AGENCY
COLLECTED BY <u>ESB, WGL</u> DATE <u>9/8/04</u>	LOT #
TAXONOMIST <u>WGL</u> DATE <u>1/3/05</u>	SUBSAMPLE TARGET <input checked="" type="checkbox"/> 100 <input type="checkbox"/> 200 <input type="checkbox"/> 300 <input type="checkbox"/> Other

Enter Family and/or Genus and Species name on blank line.

Organisms	No.	LS	TI	TCR	Organisms	No.	LS	TI	TCR
Oligochaeta					Megastomata				
Hirudinea					Water Penny				
Isopoda					Coleoptera				
Amphipoda					Dragonfly				
Decapoda					Longhorn				
Ephemeroptera					Beetle				
Baetis					Diptera				
Stonema					Crane Fly				
Plecoptera					Water Bug				
Trichoptera					Chironomid				
Chironomidae					Gastropoda				
Hemiptera					Tracheopoda				
					Pelecypoda				
					Other				
					planaria				
					odonata				
					coen				

Taxonomic certainty rating (TCR) 1-5: 1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

Total No. Organisms 100

Total No. Taxa 22

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Carter Creek</u>		LOCATION <u>Tater Road</u>	
STATION # <u>2</u> RIVERMILE		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS <u>ESB, WBL</u>		LOT NUMBER	
FORM COMPLETED BY <u>ESB</u>		DATE <u>9/8/04</u> TIME <u>10:00</u> <u>AM</u> PM	REASON FOR SURVEY

HABITAT TYPES	Indicate the percentage of each habitat type present <input checked="" type="checkbox"/> Cobble <u>2</u> % <input checked="" type="checkbox"/> Snags <u>5</u> % <input checked="" type="checkbox"/> Vegetated Banks <u>5</u> % <input checked="" type="checkbox"/> Sand <u>10</u> % <input checked="" type="checkbox"/> Submerged Macrophytes <u>5</u> % <input type="checkbox"/> Other () %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input checked="" type="checkbox"/> Other <u>Surber</u> How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jabs/kicks taken in each habitat type. <input checked="" type="checkbox"/> Cobble <u>2</u> <input checked="" type="checkbox"/> Snags <u>3</u> <input checked="" type="checkbox"/> Vegetated Banks <u>3</u> <input checked="" type="checkbox"/> Sand <u>3</u> <input checked="" type="checkbox"/> Submerged Macrophytes <u>5</u> <input type="checkbox"/> Other ()
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	(2)	3	4	Slimes	(0)	1	2	3	4
Filamentous Algae	0	1	(2)	3	4	Macroinvertebrates	0	1	2	(3)	4
Macrophytes	0	(1)	2	3	4	Fish	0	1	(2)	3	4

Banded Sculpin
Sunfin
Minnows

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culicidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>Carter Creek</u>		LOCATION <u>Tater Rd</u>	
STATION # <u>2</u> RIVERMILE _____		STREAM CLASS _____	
LAT _____ LONG _____		RIVER BASIN _____	
STORET # _____		AGENCY _____	
INVESTIGATORS <u>ETB, WGL</u>			
FORM COMPLETED BY <u>WGL</u>		DATE <u>9/8/04</u> TIME <u>10:00</u> <u>AM</u> PM	REASON FOR SURVEY _____

WEATHER CONDITIONS	<table style="width: 100%;"> <tr> <td style="width: 33%;"> Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input checked="" type="checkbox"/> clear/sunny </td> <td style="width: 33%;"> Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____ <input checked="" type="checkbox"/> </td> <td style="width: 33%;"> Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____ </td> </tr> </table>	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover _____ <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % _____ <input checked="" type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____
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SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="height: 400px; border: 1px solid black; margin-top: 10px;"></div>			
STREAM CHARACTERIZATION	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____ </td> <td style="width: 50%;"> Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km² </td> </tr> </table>	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km ²	
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PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Carter Creek
9/9/04
Station 2
10:30 AM

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____	
INSTREAM FEATURES	Estimated Reach Length <u>90</u> m Estimated Stream Width <u>9</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x1000) _____ km ² Estimated Stream Depth <u>1.10</u> m Surface Velocity _____ m/sec (at thalweg) Canopy Cover <input type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input checked="" type="checkbox"/> Shaded High Water Mark <u>1.5</u> m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>10</u> % <input type="checkbox"/> Run <u>10</u> % <input type="checkbox"/> Pool <u>80</u> % Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No recovering Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD <u>4</u> m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input checked="" type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>2</u> %	
WATER QUALITY	Temperature <u>66.3°F</u> Specific Conductance <u>491 μmhos</u> Dissolved Oxygen <u>8.60 mg/L</u> pH <u>7.82</u> Turbidity <u>0.35</u> WQ Instrument Used <u>Troll 9,000</u> <u>ORP = 470</u> Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (If not measured) <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

River Code: Site 2 RM: Stream: Garters CreekDate: 9/8/04 Location: Tater Rd Site 2Scorers Full Name: EJ Betts Affiliation: V3

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE		POOL RIFFLE		POOL RIFFLE SUBSTRATE ORIGIN		SUBSTRATE QUALITY		
<input type="checkbox"/> BLDR / SLBS [10]		<input checked="" type="checkbox"/> GRAVEL [7]		Check ONE (OR 2 & AVERAGE)		Check ONE (OR 2 & AVERAGE)		Substrate <div style="border: 1px solid black; padding: 2px; display: inline-block;">14</div> Max 20
<input type="checkbox"/> BOULDER [9]		<input type="checkbox"/> SAND [6]		<input type="checkbox"/> LIMESTONE [1]	SILT:	<input type="checkbox"/> SILT HEAVY [-2]		
<input type="checkbox"/> COBBLE [8]		<input checked="" type="checkbox"/> BEDROCK [5]		<input type="checkbox"/> TILLS [1]		<input type="checkbox"/> SILT MODERATE [-1]		
<input type="checkbox"/> HARDPAN [4]		<input type="checkbox"/> DETRITUS [3]		<input type="checkbox"/> WETLANDS [0]		<input checked="" type="checkbox"/> SILT NORMAL [0]		
<input type="checkbox"/> MUCK [2]		<input type="checkbox"/> ARTIFICIAL [0]		<input checked="" type="checkbox"/> HARDPAN [0]		<input type="checkbox"/> SILT FREE [1]		
<input type="checkbox"/> SILT [2]		NOTE: Ignore Sludge Originating From Point Sources		<input type="checkbox"/> SANDSTONE [0]	EMBEDDED	<input type="checkbox"/> EXTENSIVE [-2]		
				<input type="checkbox"/> RIP/RAP [0]	NESS:	<input type="checkbox"/> MODERATE [-1]		
				<input type="checkbox"/> LACUSTRINE [0]		<input checked="" type="checkbox"/> NORMAL [0]		
				<input type="checkbox"/> SHALE [-1]		<input type="checkbox"/> NONE [1]		
				<input type="checkbox"/> COAL FINES [-2]				

NUMBER OF SUBSTRATE TYPES: ☒ 4 or More [2]
(High Quality Only, Score 5 or >) ☐ 3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)
(Structure) TYPE: Score All That Occur

TYPE		AMOUNT: (Check ONLY One or check 2 and AVERAGE)		
<input checked="" type="checkbox"/> UNDERCUT BANKS [1]	<input checked="" type="checkbox"/> POOLS > 70 cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]	<input checked="" type="checkbox"/> EXTENSIVE > 75% [11]	Cover <div style="border: 1px solid black; padding: 2px; display: inline-block;">16</div> Max 20
<input checked="" type="checkbox"/> OVERHANGING VEGETATION [1]	<input checked="" type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> AQUATIC MACROPHYTES [1]	<input checked="" type="checkbox"/> MODERATE 25-75% [7]	
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input checked="" type="checkbox"/> BOULDERS [1]	<input checked="" type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input type="checkbox"/> SPARSE 5-25% [3]	
<input checked="" type="checkbox"/> ROOTMATS [1]	COMMENTS:		<input type="checkbox"/> NEARLY ABSENT < 5% [1]	

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
<input checked="" type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]	<input type="checkbox"/> SNAGGING	Channel <div style="border: 1px solid black; padding: 2px; display: inline-block;">11</div> Max 20
<input checked="" type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> RELOCATION	
<input type="checkbox"/> LOW [2]	<input checked="" type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]	<input type="checkbox"/> CANOPY REMOVAL	
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]		<input type="checkbox"/> DREDGING	
				<input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ☐ River Right Looking Downstream ☐ f

RIPARIAN WIDTH		FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)		BANK EROSION		
L R (Per Bank)	L R (Most Predominant Per Bank)	L R	L R (Per Bank)			Riparian <div style="border: 1px solid black; padding: 2px; display: inline-block;">4.5</div> Max 10
<input checked="" type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> CONSERVATION TILLAGE [1]	<input type="checkbox"/> NONE/LITTLE [3]			
<input checked="" type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]	<input checked="" type="checkbox"/> MODERATE [2]			
<input type="checkbox"/> NARROW 5-10 m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]	<input checked="" type="checkbox"/> HEAVY/SEVERE [1]			
<input type="checkbox"/> VERY NARROW < 5 m [1]	<input type="checkbox"/> FENCED PASTURE [1]	<input type="checkbox"/> MINING/CONSTRUCTION [0]				

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH	MORPHOLOGY	CURRENT VELOCITY	POOLS & RIFFLES	
(Check 1 ONLY!)	(Check 1 or 2 & AVERAGE)	(Check All That Apply)		Pool/ Current <div style="border: 1px solid black; padding: 2px; display: inline-block;">8</div> Max 12
<input type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> EDDIES [1]	<input type="checkbox"/> TORRENTIAL [-1]	
<input checked="" type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]	
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]	<input checked="" type="checkbox"/> MODERATE [1]	<input type="checkbox"/> INTERMITTENT [-2]	
<input type="checkbox"/> 0.2-0.4m [1]		<input checked="" type="checkbox"/> SLOW [1]	<input type="checkbox"/> VERY FAST [1]	

☐ < 0.2m [POOL=0]

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS	
<input checked="" type="checkbox"/> Best Areas > 10 cm [2]	<input type="checkbox"/> MAX > 50 [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]	Rifle/Run <div style="border: 1px solid black; padding: 2px; display: inline-block;">3</div> Max 8
<input type="checkbox"/> Best Areas 5-10 cm [1]	<input checked="" type="checkbox"/> MAX < 50 [1]	<input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input checked="" type="checkbox"/> LOW [1]	
<input checked="" type="checkbox"/> Best Areas < 5 cm		<input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]	
[RIFFLE=0]			<input type="checkbox"/> EXTENSIVE [-1]	Gradient <div style="border: 1px solid black; padding: 2px; display: inline-block;">6</div> Max 10
COMMENTS:		<input type="checkbox"/> NO RIFFLE [Metric=0]		

6) GRADIENT (ft/mi): _____ DRAINAGE AREA (sq.mi.): _____

%POOL:

80

 %GLIDE:

—

%RIFFLE:

10

 %RUN:

0

* Best areas must be large enough to support a population of riffle-obligate species

Macrobenthos Qualitative Sample List

Vial #

ORDER	FAMILY	GENUS	SPECIES	COUNT	TOLERANCE VALUES	FBI	
Nematomorpha						0.000	Parasite
Hydracarina- Trembidiformes						0.000	Predators/Parasite
13 Tubellaria	Planaria			2	4	0.063	Omnivore
Porifera	Spongiidae					0.000	Filters
25 Pelecypoda	Unionidae	Villosa	iris			0.000	Filters
	Corbiculidae	Corbicula	fluminea		3.2	0.000	Filters
	Sphaeriidae				8	0.000	Filters
	Dreissenidae	Dreissena	polymorpha			0.000	Filters
Gastropoda	Ancylidae				6	0.000	Scrapers
	Lymnaeidae				6.9	0.000	Scrapers
	Lymnaeidae	Fossaria			2.6	0.000	Scrapers
6 Physidae	Physidae				8	0.000	Scrapers
	Physidae	Physella			8	0.000	Scrapers
29 Planorbidae	Planorbidae				7	0.000	Scrapers
	Planorbidae	Planorbula			7	0.000	Scrapers
7 Pleuroceridae	Pleuroceridae			4		0.000	Scrapers
	Bithyniidae	Bithynia	lentaculata			0.000	Scrapers
Annelida	Oligochaeta					0.000	Gathers
31 Hirudinea	Hirudinea				10	0.000	Gathers
Decapoda				2	8	0.167	Predators
20 Amphipoda	Isopoda			10	4	0.417	Shredders
32	Asellidae				8	0.000	Shredders
Ostracoda					8	0.000	Scavengers
Ephemeroptera	Cenidae				7	0.000	Gathers
	Cenidae	Cenis			3.1	0.000	Gathers
	Ephemeridae	Hexagenia			3.8	0.000	Gathers
11 Baetidae	Baetidae			13	4	0.542	Gathers
	Baetidae	Baetis			3.1	0.000	Gathers
	Baetidae	Baetis	brunnescolor		4	0.000	Gathers
	Baetidae	Baetis	intercalaris		2.7	0.000	Gathers
	Baetidae	Callibaetis			5.6	0.000	Gathers
21 Heptageniidae	Heptageniidae	Stenonema		2	3.1	0.063	Scrapers
	Heptageniidae	Stenonema	gildersleevei		3.1	0.000	Scrapers
9 Heptageniidae	Heptageniidae	Stenonema		1	4	0.042	Scrapers
	Heptageniidae	Stenonema	edgum		1.9	0.000	Scrapers
	Siphonuridae				7	0.000	Gathers
	Ephemerellidae	Timpanoga			1	0.000	Gathers
	Leptophlebiidae				2	0.000	Gathers
	Leptophlebiidae	Tricorythodes			2.7	0.000	Gathers
10 Isorychiidae	Isorychiidae	Isorychia			2	0.000	Filters
Coleoptera	Dytiscidae				5	0.000	Predators
	Gyrinidae				5	0.000	Predators
	Gyrinidae	Dineutus			3.7	0.000	Predators
22 Helicidae	Helicidae			1	7	0.073	Predators
	Dryopidae				5	0.000	Predators
23,24 Elmidae	Elmidae			9	4	0.375	Gathers
12 Psephenidae	Psephenidae	Psephenus		7	4	0.292	Scrapers
	Hydrophilidae					0.000	Gathers
	Hydrophilidae	Tropisternus				0.000	Gathers
14 Megaloptera	Corydalidae	Corydalus			4	0.000	Predators
	Corydalidae	Nigronia		1	4	0.042	Predators
	Stalidae				4	0.000	Predators
Trichoptera	Brachycentridae	Brachycentrus			1	0.000	Filters
17 Helicopsychidae	Helicopsychidae	Helicopsyche			3	0.000	Scrapers
	Helicopsychidae	Helicopsyche	borealis		3	0.000	Scrapers
27 Hydropsychidae	Hydropsychidae			13	4	0.542	Filters
	Hydropsychidae	Hydropsyche			4	0.000	Filters
	Hydropsychidae	Hydropsyche	bettleri		4	0.000	Filters
	Hydropsychidae	Hydropsyche	scalaris		4	0.000	Filters
	Hydropsychidae	Symphitopsyche			4	0.000	Filters
	Hydropsychidae				4	0.000	Gathers
	Hydropsychidae	Hydropsyche			3.2	0.000	Gathers
	Leptoceridae				4	0.000	Shredders
	Leptoceridae	Nectopsyche			4	0.000	Shredders
	Molannidae				6	0.000	Gathers
26 Odontoceridae	Odontoceridae				0	0.000	
	Philopotamidae				3	0.000	Filters
33 Philopotamidae	Philopotamidae	Chimarra		3	4	0.125	Filters
	Phryganeidae	Hagenella			4	0.000	Shredders
	Polycentropodidae	Cynellus			6	0.000	Filters
	Psychomyiidae	Lype			2	0.000	Gathers
30 Hemiptera	Belostomatidae	Belostoma				0.000	Predators
	Belostomatidae					0.000	Predators
	Corixidae				10	0.000	Predators
5 Gerridae	Gerridae			3	5	0.156	Predators
	Gerridae	Trepobates			5	0.000	Predators
	Nepidae					0.000	Predators
	Nepidae	Ranatra				0.000	Predators
	Notonectidae	Notonecta				0.000	Predators
4 Velidae	Velidae	Rhagovelia				0.000	Predators
Plecoptera	Chloroperlidae				1	0.000	Predators
	Perlidae	Perla			1	0.000	Predators
	Perlidae	Neoperla			1	0.000	Predators
8 Perlidae	Perlidae	Glaesseneria		5	1	0.052	Predators
1 Odonata-Anisoptera	Aeshnidae	Boyeria		2	3	0.063	Predators
	Aeshnidae				3	0.000	Predators
	Gomphidae				1	0.000	Predators
	Condylagrastidae				3	0.000	Predators
26 Condididae	Condididae				5	0.000	Predators
	Libellulidae				9	0.000	Predators
Odonata-Zygoptera	Calopterygidae				5	0.000	Predators
2 Calopterygidae	Calopterygidae	Calopteryx		3	3.7	0.116	Predators
	Coenagrionidae				6.1	0.000	Predators
19 Coenagrionidae	Coenagrionidae	Argia		3	5.1	0.159	Predators
	Coenagrionidae	Engallagma			9	0.000	Predators
	Leptidae				9	0.000	Predators
Diptera	Ceratopogonidae				5.7	0.000	Gathers
35 Blood-red Chironomidae	Blood-red Chironomidae			1	8.1	0.084	Gathers
16 Other Chironomidae	Other Chironomidae			12	6	0.750	Gathers
18 Culicidae	Culicidae			1	8	0.083	Shredders
	Simuliidae				6	0.000	Filters
34 Tipulidae	Tipulidae			2	3	0.063	Predators
	Stratiomyidae				8	0.000	Gathers
	Tabanidae				6	0.000	Predators

TAXA RICHNESS 22
 FBI 4.289
 Scraper/Filter 0.875
 EPT/Chironomidae 2.846
 % Contribution of Dominant Taxa 0.130
 EPT Index 6.000
 Community Similarity Indices 0.000
 CPOM 1.000
 Total Number Collected 0.110
 100

Comm. Loss = 0
 Jaccard Coef. = 1

total shredders

11

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

page of

STREAM NAME <u>Lost River</u>	LOCATION <u>Lost River at Tater Rd</u>	
STATION # <u>3</u>	RIVERMILE _____	STREAM CLASS _____
LAT _____	LONG _____	RIVER BASIN _____
STORET # _____	AGENCY _____	
COLLECTED BY <u>ESB, WGL</u>	DATE <u>9/1/04</u>	LOT # _____
TAXONOMIST <u>WGL</u>	DATE <u>11/3/05</u>	SUBSAMPLE TARGET <input checked="" type="checkbox"/> 100 <input type="checkbox"/> 200 <input type="checkbox"/> 300 <input type="checkbox"/> Other _____

Enter Family and/or Genus and Species name on blank line.

Organisms	No.	LS	TI	TCR	Organisms	No.	LS	TI	TCR
Oligochaeta					Megaloptera	① 2	I	WGL	1
						② 3	I	WGL	1
Hirudinea					Coleoptera	③ 4	I	WGL	1
					Long toe	④ 11	A	WGL	1
Isopoda					Water Penny	⑤ 11 + ⑥ 12	I	WGL	1
						⑦ 13	I	WGL	1
Amphipoda	③ 1	A	WGL	1	Diptera	⑧ 11	I	WGL	1
					Crane	⑨ 12	I	WGL	1
Decapoda	② 1	A	WGL	1					
Ephemeroptera	③ 1	I	WGL	1					
Swimming Baetid	④ 1	I	WGL	1					
	⑤ 1	I	WGL	1					
	⑥ 1	I	WGL	1					
	⑦ 1	I	WGL	1					
Plecoptera	③ 1	I	WGL	1					
Trichoptera	③ 1	I	WGL	1					
Helicopsychidae	④ 1	I	WGL	1					
Unknown	⑤ 1	I	WGL	1					
</									

Taxonomic certainty rating (TCR) 1-5: 1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

Total No. Organisms 100

Total No. Taxa 23

0123456789

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Lost River</u>		LOCATION <u>Tater Rd</u>	
STATION # <u>3</u> RIVERMILE		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS <u>WGL, ESB</u>		LOT NUMBER	
FORM COMPLETED BY <u>ETB</u>		DATE <u>9/8/04</u> TIME <u>13:00</u> AM <input checked="" type="checkbox"/> PM	REASON FOR SURVEY

HABITAT TYPES	Indicate the percentage of each habitat type present <input checked="" type="checkbox"/> Cobble <u>5</u> % <input checked="" type="checkbox"/> Snags <u>5</u> % <input checked="" type="checkbox"/> Vegetated Banks <u>5</u> % <input checked="" type="checkbox"/> Sand <u>20</u> % <input type="checkbox"/> Submerged Macrophytes _____ % <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input checked="" type="checkbox"/> Other <u>Surber</u> How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jabs/kicks taken in each habitat type. <input checked="" type="checkbox"/> Cobble <u>3</u> <input checked="" type="checkbox"/> Snags <u>3</u> <input checked="" type="checkbox"/> Vegetated Banks <u>3</u> <input checked="" type="checkbox"/> Sand <u>3</u> <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	<u>2</u>	3	4	Slimes	<u>0</u>	1	2	3	4
Filamentous Algae	0	<u>1</u>	2	3	4	Macroinvertebrates	0	1	<u>2</u>	3	4
Macrophytes	<u>0</u>	1	2	3	4	Fish	0	1	<u>2</u>	3	4

Minnows

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>Last River</u>		LOCATION <u>Teter Rd</u>	
STATION # <u>3</u> RIVERMILE		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS <u>LSB WGL</u>			
FORM COMPLETED BY <u>LSB</u>		DATE <u>9/1/04</u> TIME <u>11:00</u> <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	REASON FOR SURVEY

WEATHER CONDITIONS	<table style="width: 100%;"> <tr> <td style="width: 33%;"> Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clear/sunny </td> <td style="width: 33%;"> Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/> </td> <td style="width: 33%;"> Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____ </td> </tr> </table>	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____
Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____		
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="height: 400px; border: 1px solid black;"></div>			
STREAM CHARACTERIZATION	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____ </td> <td style="width: 50%;"> Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km² </td> </tr> </table>	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km ²	
Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km ²			

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

LOST RIVER
9/9/04
Station 3
11:00 AM

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential		Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present _____		
INSTREAM FEATURES	Estimated Reach Length <u>90</u> m Estimated Stream Width <u>9</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth <u>1.5</u> m Surface Velocity _____ m/sec (at thalweg) Canopy Cover <input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark <u>2</u> m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>2</u> % <input type="checkbox"/> Run <u>5</u> % <input type="checkbox"/> Pool <u>93</u> % Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No <u>recovered</u> Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
LARGE WOODY DEBRIS	LWD <u>2</u> m ² Density of LWD _____ m ³ /km ² (LWD/ reach area)		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input checked="" type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation <u>5</u> %		
WATER QUALITY	Temperature <u>68.8°F</u> Specific Conductance <u>458 µmhos</u> Dissolved Oxygen <u>8.53 mg/L</u> pH <u>7.96</u> Turbidity <u>6.1</u> WQ Instrument Used <u>Troll 9000, 6m cable</u> <u>ORP = 455</u> Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____		
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

River Code: _____ RM: _____ Stream: Lost RiverDate: 9/1/04 Location: Site 3 Inter RScorers Full Name: Ed Belmonte Affiliation: V3

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE		POOL RIFFLE	POOL RIFFLE	SUBSTRATE ORIGIN	SUBSTRATE QUALITY
<input type="checkbox"/> BLDR /SLBS [10]	<input type="checkbox"/> GRAVEL [7]	Check ONE (OR 2 & AVERAGE)		Check ONE (OR 2 & AVERAGE)	
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/> SAND [6]			<input type="checkbox"/> SILT: <input type="checkbox"/> SILT HEAVY [-2]	
<input checked="" type="checkbox"/> COBBLE [8]	<input type="checkbox"/> BEDROCK [5]			<input type="checkbox"/> SILT MODERATE [-1]	
<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/> DETRITUS [3]			<input checked="" type="checkbox"/> SILT NORMAL [0]	
<input type="checkbox"/> MUCK [2]	<input type="checkbox"/> ARTIFICIAL [0]			<input type="checkbox"/> SILT FREE [1]	
<input type="checkbox"/> SILT [2]	NOTE: Ignore Sludge Originating From Point Sources		<input checked="" type="checkbox"/> HARDPAN [0]	<input type="checkbox"/> EXTENSIVE [-2]	
			<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> MODERATE [-1]	
			<input type="checkbox"/> RIP/RAP [0]	<input checked="" type="checkbox"/> NORMAL [0]	
			<input type="checkbox"/> LACUSTRINE [0]	<input type="checkbox"/> NONE [1]	
			<input type="checkbox"/> SHALE [-1]		
			<input type="checkbox"/> COAL FINES [-2]		

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >) ☒ 4 or More [2] ☐ 3 or Less [0]

COMMENTS: _____

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur		AMOUNT: (Check ONLY One or check 2 and AVERAGE)	Cover
<input checked="" type="checkbox"/> UNDERCUT BANKS [1]	<input checked="" type="checkbox"/> POOLS > 70 cm [2]	<input type="checkbox"/> EXTENSIVE > 75% [11]	<div style="border: 1px solid black; padding: 5px; text-align: center;">16 Max 20</div>
<input checked="" type="checkbox"/> OVERHANGING VEGETATION [1]	<input checked="" type="checkbox"/> ROOTWADS [1]	<input checked="" type="checkbox"/> MODERATE 25-75% [7]	
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input checked="" type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> SPARSE 5-25% [3]	
<input checked="" type="checkbox"/> ROOTMATS [1]		<input type="checkbox"/> NEARLY ABSENT < 5% [1]	

COMMENTS: _____

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	Channel
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]	<input type="checkbox"/> SNAGGING	<div style="border: 1px solid black; padding: 5px; text-align: center;">11 Max 20</div>
<input checked="" type="checkbox"/> MODERATE [3]	<input checked="" type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> RELOCATION	
<input type="checkbox"/> LOW [2]	<input checked="" type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]	<input type="checkbox"/> CANOPY REMOVAL	
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]		<input type="checkbox"/> DREDGING	
				<input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH		FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)		BANK EROSION	Riparian
L R (Per Bank)	L R (Most Predominant Per Bank)	L R		L R (Per Bank)	<div style="border: 1px solid black; padding: 5px; text-align: center;">4 Max 10</div>
<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> CONSERVATION TILLAGE [1]		<input type="checkbox"/> NONE/LITTLE [3]	
<input checked="" type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]		<input checked="" type="checkbox"/> MODERATE [2]	
<input type="checkbox"/> NARROW 5-10 m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]		<input type="checkbox"/> HEAVY/SEVERE [1]	
<input checked="" type="checkbox"/> VERY NARROW < 5 m [1]	<input type="checkbox"/> FENCED PASTURE [1]	<input type="checkbox"/> MINING/CONSTRUCTION [0]			

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH	MORPHOLOGY	CURRENT VELOCITY [POOLS & RIFFLES]	Pool/Current
(Check 1 ONLY!)	(Check 1 or 2 & AVERAGE)	(Check All That Apply)	<div style="border: 1px solid black; padding: 5px; text-align: center;">10 Max 12</div>
<input checked="" type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> EDDIES [1]	
<input type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> TORRENTIAL [-1]	
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]	<input type="checkbox"/> FAST [1]	
<input type="checkbox"/> 0.2-0.4m [1]		<input checked="" type="checkbox"/> MODERATE [1]	

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE				Riffle/Run
RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS	<div style="border: 1px solid black; padding: 5px; text-align: center;">4 Max 8</div>
<input type="checkbox"/> Best Areas > 10 cm [2]	<input type="checkbox"/> MAX > 50 [2]	<input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]	
<input checked="" type="checkbox"/> Best Areas 5-10 cm [1]	<input checked="" type="checkbox"/> MAX < 50 [1]	<input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input checked="" type="checkbox"/> LOW [1]	
<input type="checkbox"/> Best Areas < 5 cm		<input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]	
[RIFFLE=0]			<input type="checkbox"/> EXTENSIVE [-1]	

COMMENTS: _____

6) GRADIENT (ft/mi): _____ DRAINAGE AREA (sq.mi.): _____

 %POOL: 93 %GLIDE: —
 %RIFFLE: 2 %RUN: 5

* Best areas must be large enough to support a population of riffle-obligate species

Macrobenthos Qualitative Sample List

Vial #

ORDER	FAMILY	GENUS	SPECIES	COUNT	TOLERANCE VALUES	FBI	
Nematomorpha						0.000	Parasite
Hydracarina-Trombidiformes						0.000	Predators/Parasite
13 Tubellaria	Planaria			3	4	0.148	Omnivore
Porifera	Spongiidae					0.000	Filters
25 Paleocypoda	Unionidae	Villosa	iris			0.000	Filters
	Corbiculidae	Corbicula	fluminea	1	3.2	0.040	Filters
	Sphaeriidae				8	0.000	Filters
	Dreissenidae	Dreissena	polymorpha			0.000	Filters
Gastropoda	Ancylidae				6	0.000	Scrapers
	Lymnaeidae				6.9	0.000	Scrapers
	Lymnaeidae	Fossaria			2.6	0.000	Scrapers
6	Physidae				8	0.000	Scrapers
	Physidae	Physella			8	0.000	Scrapers
29	Planorbidae				7	0.000	Scrapers
	Planorbidae	Planorbula			7	0.000	Scrapers
7	Pleuroceridae			19		0.000	Scrapers
	Bithyniidae	Bithynia	tentaculata			0.000	Scrapers
Annelida	Oligochaeta					0.000	Gathers
31	Hirudinea				10	0.000	Gathers
3	Decapoda			2	8	0.198	Predators
20 Amphipoda				3	4	0.148	Shredders
32	Isopoda	Asellidae			8	0.000	Shredders
Ostracoda					8	0.000	Scavengers
Ephemeroptera	Caenidae				7	0.000	Gathers
	Caenidae	Caenis			3.1	0.000	Gathers
	Ephemeridae	Hexagenia			3.6	0.000	Gathers
11	Baetidae			1	4	0.049	Gathers
	Baetidae	Baetis			3.1	0.000	Gathers
	Baetidae	Baetis	brunneicolar		4	0.000	Gathers
	Baetidae	Baetis	intercalaris		2.7	0.000	Gathers
	Baetidae	Callibaetis			5.6	0.000	Gathers
21	Heptageniidae	Stenonema		3	3.1	0.115	Scrapers
	Heptageniidae	Stenonema	glidersleevei		3.1	0.000	Scrapers
9	Heptageniidae	Stenonema		4	4	0.198	Scrapers
	Heptageniidae	Stenonema	edgum		1.9	0.000	Scrapers
	Siphonuridae				7	0.000	Gathers
	Ephemerellidae	Timpanoga			1	0.000	Gathers
	Lepidophlebiidae				2	0.000	Gathers
	Lepidophlebiidae	Tricorythodes			2.7	0.000	Gathers
10	Isonychidae	Isonychia		2	2	0.049	Filters
Coleoptera	Dytiscidae				5	0.000	Predators
	Gyrinidae				5	0.000	Predators
	Gyrinidae	Dineutus			3.7	0.000	Predators
22	Helophidae				7	0.000	Predators
	Dryopidae				5	0.000	Predators
23,24	Elmidae			10	4	0.494	Gathers
12	Psephenidae	Psephenus		20	4	0.988	Scrapers
	Hydrophiliidae					0.000	Gathers
	Hydrophiliidae	Tropisternus				0.000	Gathers
14 Megaloptera	Corydalidae			1	4	0.049	Predators
	Corydalidae	Nigronia		1	4	0.049	Predators
	Sialidae				4	0.000	Predators
Trichoptera	Brachycentridae	Brachycentrus			1	0.000	Filters
17	Helicopsychidae	Helicopsyche		6	3	0.222	Scrapers
	Helicopsychidae	Helicopsyche	bonelli		3	0.000	Scrapers
27	Hydropsychidae			2	4	0.099	Filters
	Hydropsychidae	Hydropsyche			4	0.000	Filters
	Hydropsychidae	Hydropsyche	bettleri		4	0.000	Filters
	Hydropsychidae	Hydropsyche	scalaris		4	0.000	Filters
	Hydropsychidae	Symphlopsyche			4	0.000	Filters
	Hydroptilidae	Hydroptila			3.2	0.000	Gathers
	Leptoceridae				4	0.000	Shredders
	Leptoceridae	Nectopsyche			4	0.000	Shredders
	Molannidae				6	0.000	Gathers
26	Odontoceridae				0	0.000	
	Phlebotomidae				3	0.000	Filters
33	Phlebotomidae	Chimarra		8	4	0.395	Filters
	Phryganeidae	Hagenella			4	0.000	Shredders
	Polycentropodidae	Cymellus			6	0.000	Filters
	Psychomyiidae	Lybie			2	0.000	Gathers
30 Hemiptera	Belostomatidae					0.000	Predators
	Belostomatidae	Belostomat				0.000	Predators
	Corixidae				10	0.000	Predators
5	Gerridae			2	5	0.123	Predators
	Gerridae	Trepobates			5	0.000	Predators
	Nepidae					0.000	Predators
	Nepidae	Ranatra				0.000	Predators
	Notonectidae	Notonecta				0.000	Predators
4	Velidae	Rhyagovelia				0.000	Predators
Plecoptera	Chloroperlidae				1	0.000	Predators
	Perlidae	Parletta			1	0.000	Predators
	Perlidae	Neoperla			1	0.000	Predators
8	Perlidae	Classenia		3	1	0.037	Predators
1	Aeshnidae			2	3	0.074	Predators
Odonata-Anisoptera	Aeshnidae	Boyeria			3	0.000	Predators
	Gomphidae				1	0.000	Predators
	Cordulegastriidae				3	0.000	Predators
28	Cordulidae				5	0.000	Predators
	Libellulidae				9	0.000	Predators
Odonata-Zygoptera	Calopterygidae				5	0.000	Predators
2	Calopterygidae	Calopteryx		1	3.7	0.046	Predators
	Coenagrionidae				6.1	0.000	Predators
19	Coenagrionidae	Argia		2	5.1	0.126	Predators
	Coenagrionidae	Engallagma			9	0.000	Predators
	Leucidae				9	0.000	Predators
Diptera	Ceratozoogonidae				5.7	0.000	Gathers
35	Blood-red Chironomidae				8.1	0.000	Gathers
16	Other Chironomidae			3	6	0.222	Gathers
18	Culicidae				8	0.000	Shredders
	Simuliidae				6	0.000	Filters
34	Tipulidae			1	3	0.037	Predators
	Stratiomyidae				8	0.000	Gathers
	Tabanidae				6	0.000	Predators

TAXA RICHNESS

FBI 23
 Scraper/Filter 3,906
 EPT/Chironomidae 4,000
 % Contribution of Dominant Taxa 8,667
 EPT Index 0.200
 Community Similarity Indices 8,000
 CPOM 0.000
 Total Number Collected 1,000
 CPOM 0.030

Comm. Loss = 0
 Jaccard Coef. = 1

total shredders 3

page of

Enter Family and/or Genus and Species name on blank line.

STENOGRAM

Total No. Taxa 19

A-29

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME <u>Lost River</u>		LOCATION <u>Fishers Ford Bridge 500N + 200E</u>	
STATION # <u>4</u> RIVERMILE		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS <u>ESB, WCL</u>		LOT NUMBER	
FORM COMPLETED BY <u>WCL</u>		DATE <u>9/8/04</u> TIME <u>15:00</u> AM <input checked="" type="radio"/> PM	REASON FOR SURVEY

HABITAT TYPES	Indicate the percentage of each habitat type present <input checked="" type="checkbox"/> Cobble <u>2</u> % <input checked="" type="checkbox"/> Snags <u>2</u> % <input checked="" type="checkbox"/> Vegetated Banks <u>10</u> % <input checked="" type="checkbox"/> Sand <u>20</u> % <input checked="" type="checkbox"/> Submerged Macrophytes <u>15</u> % <input type="checkbox"/> Other () %
	Gear used <input checked="" type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jabs/kicks taken in each habitat type. <input checked="" type="checkbox"/> Cobble <u>3</u> <input checked="" type="checkbox"/> Snags <u>3</u> <input checked="" type="checkbox"/> Vegetated Banks <u>3</u> <input checked="" type="checkbox"/> Sand <u>3</u> <input checked="" type="checkbox"/> Submerged Macrophytes <u>1</u> <input type="checkbox"/> Other ()
SAMPLE COLLECTION	
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	<u>1</u>	2	3	4	Slimes	<u>1</u>	1	2	3	4
Filamentous Algae	0	1	<u>2</u>	3	4	Macroinvertebrates	0	1	2	<u>3</u>	4
Macrophytes	0	1	<u>2</u>	3	4	Fish	0	1	<u>2</u>	3	4

Alabama Hog Sucker

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME <u>Lat River</u>	LOCATION <u>Fisher's Ford Bridge</u> <u>SOON 1 2006</u>	
STATION # <u>4</u> RIVERMILE	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS <u>ESB, WGL</u>		
FORM COMPLETED BY <u>ESB</u>	DATE <u>9/8/04</u> TIME <u>1500</u> AM <input checked="" type="radio"/> PM	REASON FOR SURVEY

WEATHER CONDITIONS	<table style="width: 100%;"> <tr> <td style="width: 33%;"> Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clear/sunny </td> <td style="width: 33%;"> Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/> </td> <td style="width: 33%;"> Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____ </td> </tr> </table>	Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____
Now <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input type="checkbox"/> %cloud cover <input checked="" type="checkbox"/> clear/sunny	Past 24 hours <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> % <input checked="" type="checkbox"/>	Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature _____ °C Other _____		
SITE LOCATION/MAP	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p> <div style="height: 400px; border: 1px solid black;"></div>			
STREAM CHARACTERIZATION	<table style="width: 100%;"> <tr> <td style="width: 50%;"> Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____ </td> <td style="width: 50%;"> Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km² </td> </tr> </table>	Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km ²	
Stream Subsystem <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater Catchment Area _____ km ²			

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

LOST River
Station 4 9/1/0
1508 PM

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	Local Watershed NPS Pollution <input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>Red Canary Grass</u>	
INSTREAM FEATURES	Estimated Reach Length <u>120</u> m Estimated Stream Width <u>12</u> m Sampling Reach Area _____ m ² Area in km ² (m ² x 1000) _____ km ² Estimated Stream Depth <u>25</u> m Surface Velocity _____ m/sec (at thalweg) Canopy Cover <input checked="" type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Morphology Types <input type="checkbox"/> Riffle <u>3</u> % <input type="checkbox"/> Run <u>10</u> % <input type="checkbox"/> Pool <u>83</u> % Channelized <input type="checkbox"/> Yes <input type="checkbox"/> No <u>recovery</u> Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
LARGE WOODY DEBRIS	LWD <u>1</u> m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free <input checked="" type="checkbox"/> Floating Algae <input checked="" type="checkbox"/> Attached Algae dominant species present <u>water willow</u> Portion of the reach with aquatic vegetation <u>25</u> %	
WATER QUALITY	Temperature <u>71.5</u> °F Specific Conductance <u>455</u> µmhos Dissolved Oxygen <u>8.33</u> mg/L pH <u>7.97</u> Turbidity <u>2.4</u> WQ Instrument Used <u>DRP = 387</u> Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globes <input type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained	
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not embedded, are the undersides black? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)			Location in Area
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Reach	
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)		
Boulder	> 256 mm (10")		Muck-Mud	black, very fine organic (FPOM)		
Cobble	64-256 mm (2.5"-10")		Marl	grey, shell fragments		
Gravel	2-64 mm (0.1"-2.5")					
Sand	0.06-2mm (gritty)					
Silt	0.004-0.06 mm					
Clay	< 0.004 mm (slick)					

River Code: _____ RM: _____ Stream: Lost River
 Date: 9/8/04 Location: Site 4 Fishers Ford Bridge
 Scorers Full Name: Ed Blante Affiliation: V3

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE		POOL RIFFLE		POOL RIFFLE SUBSTRATE ORIGIN		SUBSTRATE QUALITY		
<input type="checkbox"/> BLDR /SLBS [10]	_____	<input checked="" type="checkbox"/> GRAVEL [7]	_____	Check ONE (OR 2 & AVERAGE)		Check ONE (OR 2 & AVERAGE)		Substrate <div style="border: 1px solid black; padding: 5px; text-align: center;">12</div> Max 20
<input type="checkbox"/> BOULDER [9]	_____	<input type="checkbox"/> SAND [8]	_____	<input type="checkbox"/> LIMESTONE [1]	SILT:	<input type="checkbox"/> SILT HEAVY [-2]		
<input type="checkbox"/> COBBLE [8]	_____	<input type="checkbox"/> BEDROCK [5]	_____	<input checked="" type="checkbox"/> TILLS [1]		<input type="checkbox"/> SILT MODERATE [-1]		
<input type="checkbox"/> HARDPAN [4]	_____	<input type="checkbox"/> DETRITUS [3]	_____	<input type="checkbox"/> WETLANDS [0]		<input checked="" type="checkbox"/> SILT NORMAL [0]		
<input type="checkbox"/> MUCK [2]	_____	<input type="checkbox"/> ARTIFICIAL [0]	_____	<input type="checkbox"/> HARDPAN [0]		<input type="checkbox"/> SILT FREE [1]		
<input checked="" type="checkbox"/> SILT [2]	_____	NOTE: Ignore Sludge Originating From Point Sources		<input type="checkbox"/> SANDSTONE [0]	EMBEDDED	<input type="checkbox"/> EXTENSIVE [-2]		
				<input type="checkbox"/> RIP/RAP [0]	NESS:	<input type="checkbox"/> MODERATE [-1]		
				<input type="checkbox"/> LACUSTRINE [0]		<input checked="" type="checkbox"/> NORMAL [0]		
				<input type="checkbox"/> SHALE [-1]		<input type="checkbox"/> NONE [1]		
				<input type="checkbox"/> COAL FINES [-2]				

NUMBER OF SUBSTRATE TYPES: ☒ 4 or More [2] ☐ 3 or Less [0]
 (High Quality Only, Score 5 or >)

COMMENTS: _____

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur		AMOUNT: (Check ONLY One or check 2 and AVERAGE)		
<input type="checkbox"/> UNDERCUT BANKS [1]	<input checked="" type="checkbox"/> POOLS > 70 cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]	<input type="checkbox"/> EXTENSIVE > 75% [11]	Cover <div style="border: 1px solid black; padding: 5px; text-align: center;">15</div> Max 20
<input checked="" type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> ROOTWADS [1]	<input checked="" type="checkbox"/> AQUATIC MACROPHYTES [1]	<input checked="" type="checkbox"/> MODERATE 25-75% [7]	
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input checked="" type="checkbox"/> BOULDERS [1]	<input checked="" type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input type="checkbox"/> SPARSE 5-25% [3]	
<input checked="" type="checkbox"/> ROOTMATS [1]	COMMENTS: _____		<input type="checkbox"/> NEARLY ABSENT < 5% [1]	

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER	
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]	<input type="checkbox"/> SNAGGING	Channel <div style="border: 1px solid black; padding: 5px; text-align: center;">11</div> Max 20
<input checked="" type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> RELOCATION	
<input type="checkbox"/> LOW [2]	<input checked="" type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]	<input type="checkbox"/> CANOPY REMOVAL	
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]		<input type="checkbox"/> DREDGING	
				<input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS	

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ☒ River Right Looking Downstream ☐ River Left Looking Downstream

RIPARIAN WIDTH		FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)		BANK EROSION		
L R (Per Bank)	L R (Most Predominant Per Bank)	L R	L R (Per Bank)			Riparian <div style="border: 1px solid black; padding: 5px; text-align: center;">4.5</div> Max 10
<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> CONSERVATION TILLAGE [1]	<input type="checkbox"/> NONE/LITTLE [3]			
<input checked="" type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]	<input checked="" type="checkbox"/> MODERATE [2]			
<input checked="" type="checkbox"/> NARROW 5-10 m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]	<input type="checkbox"/> HEAVY/SEVERE [1]			
<input type="checkbox"/> VERY NARROW < 5 m [1]	<input checked="" type="checkbox"/> FENCED PASTURE [1]	<input type="checkbox"/> MINING/CONSTRUCTION [0]				
<input type="checkbox"/> NONE [0]						

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH	MORPHOLOGY	CURRENT VELOCITY POOLS & RIFFLES		
(Check 1 ONLY)	(Check 1 or 2 & AVERAGE)	(Check All That Apply)	Pool/ Current <div style="border: 1px solid black; padding: 5px; text-align: center;">8</div> Max 12	
<input type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> EDDIES [1]		<input type="checkbox"/> TORRENTIAL [-1]
<input checked="" type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> FAST [1]		<input type="checkbox"/> INTERSTITIAL [-1]
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]	<input checked="" type="checkbox"/> MODERATE [1]		<input type="checkbox"/> INTERMITTENT [-2]
<input type="checkbox"/> 0.2-0.4m [1]		<input checked="" type="checkbox"/> SLOW [1]		<input type="checkbox"/> VERY FAST [1]
<input type="checkbox"/> < 0.2m [POOL=0]	COMMENTS: _____			

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS	
<input checked="" type="checkbox"/> Best Areas > 10 cm [2]	<input type="checkbox"/> MAX > 50 [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]	Riffle/Run <div style="border: 1px solid black; padding: 5px; text-align: center;">4</div> Max 8
<input checked="" type="checkbox"/> Best Areas 5-10 cm [1]	<input checked="" type="checkbox"/> MAX < 50 [1]	<input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input checked="" type="checkbox"/> LOW [1]	
<input type="checkbox"/> Best Areas < 5 cm		<input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]	
[RIFFLE=0]			<input type="checkbox"/> EXTENSIVE [-1]	Gradient <div style="border: 1px solid black; padding: 5px; text-align: center;">6</div> Max 10
COMMENTS: _____		<input type="checkbox"/> NO RIFFLE [Metric=0]		

6) GRADIENT (ft/mi): _____ DRAINAGE AREA (sq.mi.): _____

%POOL: 85 %GLIDE: —
 %RIFFLE: 5 %RUN: 10

* Best areas must be large enough to support a population of riffle-obligate species

Macrobenthos Qualitative Sample List

Vial #

ORDER	FAMILY	GENUS	SPECIES	COUNT	TOLERANCE VALUES	FBI	
Nematomorpha						0.000	Parasite
Hydracarina- Trembidiformes						0.000	Predators/Parasite
13 Tubellaria	Planaria			5	4	0.287	Omnivore
Porifera	Spongiidae					0.000	Filters
25 Pelecypoda	Unionidae	Villosa	iris			0.000	Filters
	Corbiculidae	Corbicula	fluminea		3.2	0.000	Filters
	Sphaeriidae				8	0.000	Filters
	Dreissenidae	Dreissena	polymorpha			0.000	Filters
Gastropoda	Ancylidae				6	0.000	Scrapers
	Lymnaeidae				6.9	0.000	Scrapers
	Lymnaeidae	Fossaria			2.6	0.000	Scrapers
6	Physidae				8	0.000	Scrapers
	Physidae	Physella			8	0.000	Scrapers
29	Planorbidae			1	7	0.093	Scrapers
	Planorbidae	Planorbula			7	0.000	Scrapers
7	Pleuroceridae			24		0.000	Scrapers
	Bithyniidae	Bithynia	tentaculata			0.000	Scrapers
Annelida	Oligochaeta					0.000	Gathers
31	Hirudinea			1	10	0.133	Gathers
3	Decapoda			3	8	0.320	Predators
20	Amphipoda			2	4	0.107	Shredders
32	Isopoda	Asellidae		2	8	0.213	Shredders
Ostracoda					8	0.000	Scavengers
Ephemeroptera	Caenidae				7	0.000	Gathers
	Caenidae	Caenis			3.1	0.000	Gathers
	Ephemeridae	Hexagenia			3.6	0.000	Gathers
11	Baetidae				4	0.000	Gathers
	Baetidae	Baetis		4	3.1	0.165	Gathers
	Baetidae	Baetis	brunneicolor		4	0.000	Gathers
	Baetidae	Baetis	intercalaris		2.7	0.000	Gathers
	Baetidae	Callibaetis			5.6	0.000	Gathers
21	Heptageniidae	Stenacron			3.1	0.000	Scrapers
	Heptageniidae	Stenacron	glidersleevei		3.1	0.000	Scrapers
9	Heptageniidae	Stenonema		7	4	0.373	Scrapers
	Heptageniidae	Stenonema	exiguum		1.9	0.000	Scrapers
	Siphonuridae				7	0.000	Gathers
	Ephemerellidae	Timpanoga			1	0.000	Gathers
	Leptophlebiidae				2	0.000	Gathers
	Leptophlebiidae	Tricorythodes			2.7	0.000	Gathers
10	Isonychidae	Isonychia			2	0.000	Filters
Coleoptera	Dytiscidae				5	0.000	Predators
	Gyrinidae				5	0.000	Predators
	Gyrinidae	Dineutus			3.7	0.000	Predators
22	Halpidae				7	0.000	Predators
	Dryopidae				5	0.000	Predators
23,24	Elmidae			12	4	0.640	Gathers
12	Psephenidae	Psephenus		15	4	0.800	Scrapers
	Hydrophilidae	Tropisternus				0.000	Gathers
14	Megaloidea	Corydalidae	Corydalus		4	0.000	Predators
15		Corydalidae	Nigronia		4	0.000	Predators
	Sialidae				4	0.000	Predators
Trichoptera	Brachycentridae	Brachycentrus			1	0.000	Filters
17	Helicopsychidae	Helicopsyche		8	3	0.320	Scrapers
	Helicopsychidae	Helicopsyche	borealis		3	0.000	Scrapers
27	Hydropsychidae			2	4	0.107	Filters
	Hydropsychidae	Hydropsyche			4	0.000	Filters
	Hydropsychidae	Hydropsyche	betteni		4	0.000	Filters
	Hydropsychidae	Hydropsyche	scalaris		4	0.000	Filters
	Hydropsychidae	Symphitopsyche			4	0.000	Filters
	Hydroptilidae				4	0.000	Gathers
	Hydroptilidae	Hydroptila			3.2	0.000	Gathers
	Leptoceridae				4	0.000	Shredders
	Leptoceridae	Nectopsyche			4	0.000	Shredders
	Molannidae				6	0.000	Gathers
26	Odontoceridae			1	0	0.000	
	Philopotamidae				3	0.000	Filters
33	Philopotamidae	Chimarra			4	0.000	Filters
	Phygadeuonidae	Hagenella			4	0.000	Shredders
	Polycetopodidae	Cynellus			6	0.000	Filters
	Psychomyiidae	Lype			2	0.000	Gathers
30	Hemiptera	Belostomatidae		1		0.000	Predators
	Belostomatidae	Belostoma				0.000	Predators
	Corixidae				10	0.000	Predators
5	Gerridae				5	0.000	Predators
	Gerridae	Trepobates			5	0.000	Predators
	Nepidae					0.000	Predators
	Nepidae	Ranatra				0.000	Predators
	Notonectidae	Notonecta				0.000	Predators
4	Velidae	Rhagovelia				0.000	Predators
Plecoptera	Chloroperlidae				1	0.000	Predators
	Perlidae	Perlaria			1	0.000	Predators
	Perlidae	Naoperla			1	0.000	Predators
8		Perlidae	Classenia	1	1	0.013	Predators
1	Odonata-Anisoptera	Aeshnidae			3	0.000	Predators
	Aeshnidae	Boyeria			3	0.000	Predators
	Gomphidae				1	0.000	Predators
	Cordulegastriidae				3	0.000	Predators
28		Cordulidae		1	5	0.267	Predators
	Libellulidae				9	0.000	Predators
Odonata-Zygoptera	Calopterygidae				5	0.000	Predators
2		Calopterygidae	Calopteryx	3	3.7	0.148	Predators
	Coenagrionidae				6.1	0.000	Predators
19		Coenagrionidae	Argia	7	5.1	0.478	Predators
	Coenagrionidae	Engellagma			6	0.000	Predators
	Leptidae				8	0.000	Predators
	Ceratopogonidae				5.7	0.000	Gathers
35	Blood-red Chironomidae				8.1	0.000	Gathers
16	Other Chironomidae				6	0.000	Gathers
	Culicidae				8	0.000	Shredders
18	Simuliidae				6	0.000	Filters
34	Tipulidae				3	0.000	Predators
	Stratiomyidae				8	0.000	Gathers
	Tabanidae				6	0.000	Predators

TAXA RICHNESS 19
 FBI 4.243
 Scraper/Filter 27.500
 EPT/Chironomidae #DIV/0! 23/0
 % Contribution of Dominant Taxa 0.240
 EPT Index 6.000
 Community Similarity Indices 0.000 Comm. Loss = 0
 CPOM 1.000 Jaccard Coef. = 1
 0.040
 Total Number Collected 100

total shredders 4

APPENDIX II:

MACROINVERTEBRATE VOUCHER SPECIMENS



April 22, 2005

Dr. Arwin Provonsha
Department of Entomolgy
901 W. State Street
West Lafayette, IN 47907-2089

Re: Invertebrate Voucher Specimens
Lost River, Orange County, Indiana

Dear Dr. Provonsha:

Enclosed you will find thirty-five (35) representative macroinvertebrate specimens, in individually labeled vials, and photo-documentation of each. This voucher collection is being submitted to Purdue University Department of Entomology as part of the Lost River Water Quality Monitoring Study. This project is being done for the Orange County Soil and Water Conservation District and the Indiana Department of Natural Resources through the Lake and River Enhancement (LARE) program. Please verify these specimens for us.

Please contact me at 630-724-9200 ext. 154, if you have any questions or concerns. Thank you very much.

Very truly yours,
V3 Companies of Illinois, Ltd.

Walter Levernier
Ecologist

Edward J Belmonte
Senior Ecologist/Project Manager

WGL/ss

Attachments

cc: Frank Hodges, IDNR
Cecil Rich, IDNR
V3 File

PURDUE
UNIVERSITY

Department of Entomology

27 Apr 2005

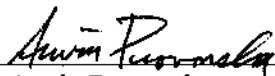
Walter Levernier
V3 Companies of Illinois Ltd.
7325 Janes Avenue
Woodridge, IL 60517

Dear Dr. Levernier,

Thank you for depositing in PERC voucher specimen from the Lost River Water Quality Monitoring Study. The specimens arrived in good condition. I have examined them, and within my own level of expertise, find all of the identifications to be accurate.

We appreciate the deposition of materials here, and look forward to continued cooperation in the future.

Sincerely,



Arwin Provonsha
Curator of Collections



Lost River
Water Quality
Monitoring Study
Photo 1
Vial No. 1

1/3/05

Family: *Aeshnidae*

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 2
Vial 2

1/3/05

Calopterygidae
Calopteryx sp.

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 3
Vial 3

1/3/05

Order: *Decapoda*

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 4
Vial 4

1/3/05

Veliidae Rhagovelia sp.

Station 1



Lost River
Water Quality
Monitoring Study
Photo 5
Vial 5

1/3/05

Family: *Gerridae*

Station 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 6
Vial 6

1/3/05

Family: *Physidae*

Stations 1,2



Lost River
Water Quality
Monitoring Study
Photo 7
Vial 7

1/3/05

Family: *Pleuroceridae*

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 8
Vial 8

1/3/05

Perlidae Claassenia sp.

Stations 1,2,3,4

Lost River
Water Quality
Monitoring Study
Photo 9
Vial 9

1/3/05

*Heptageniidae
Stenonama sp.*

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 10
Vial 10

1/3/05

Isonychiidae
Isonychia sp.

Stations 1,3

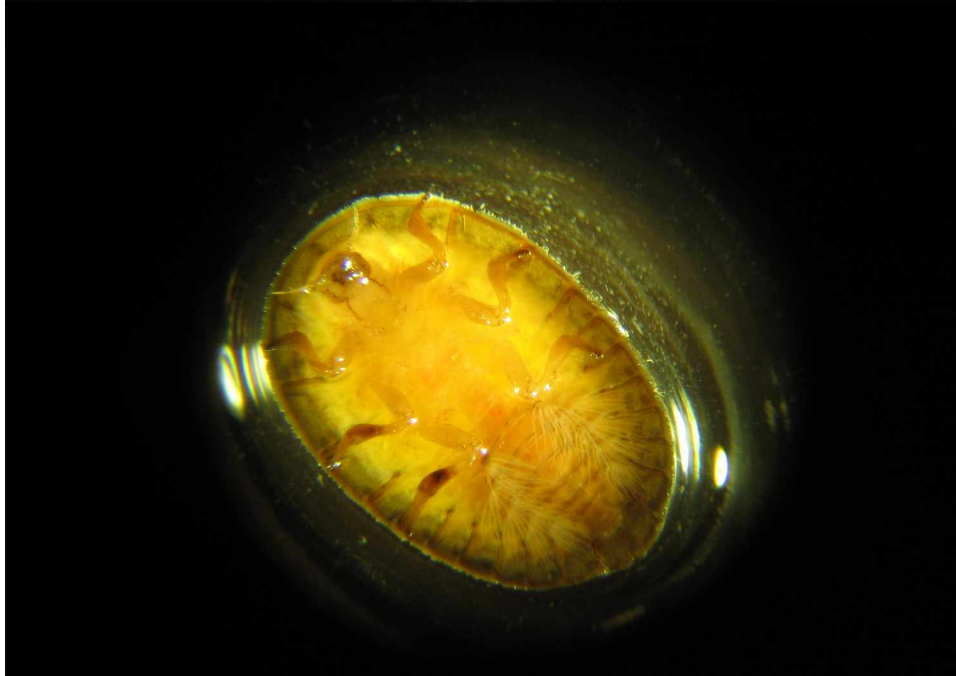


Lost River
Water Quality
Monitoring Study
Photo 11
Vial 11

2/24/05

Family: *Beatidae*

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 12
Vial 12

1/3/05

Psephenidae *Psephenus*
sp.

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 13
Vial 13

1/3/05

Class: *Turbellaria*

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 14
Vial 14

1/3/05

Corydalidae
Corydalis sp.

Stations 1,3

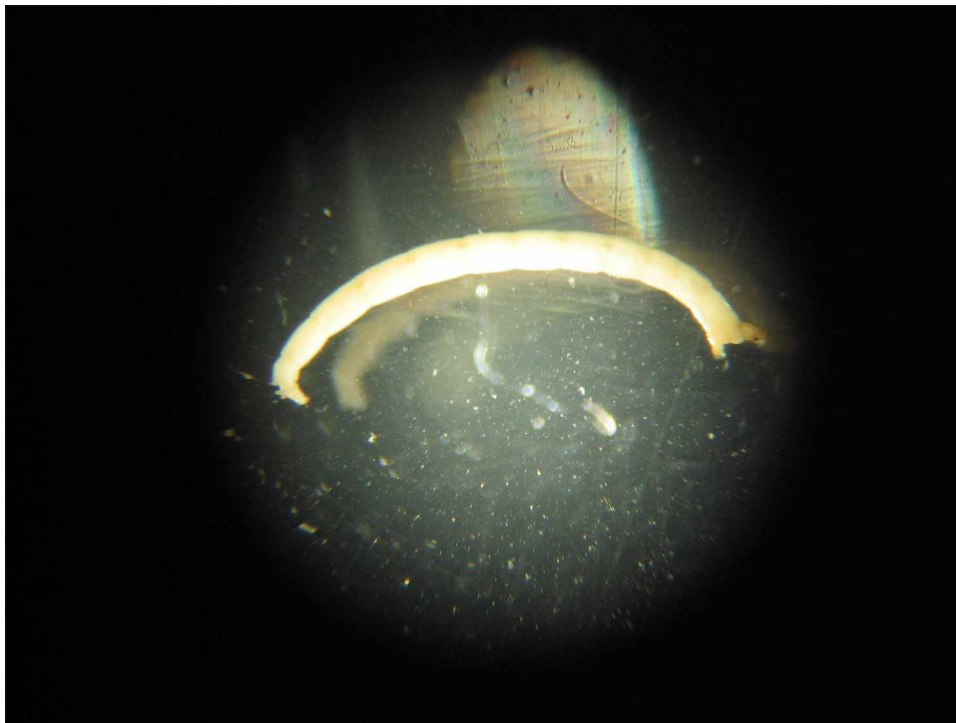


Lost River
Water Quality
Monitoring Study
Vial 15
Photo 15

1/3/05

Corydalidae
Nigronia sp.

Stations 1,2,3

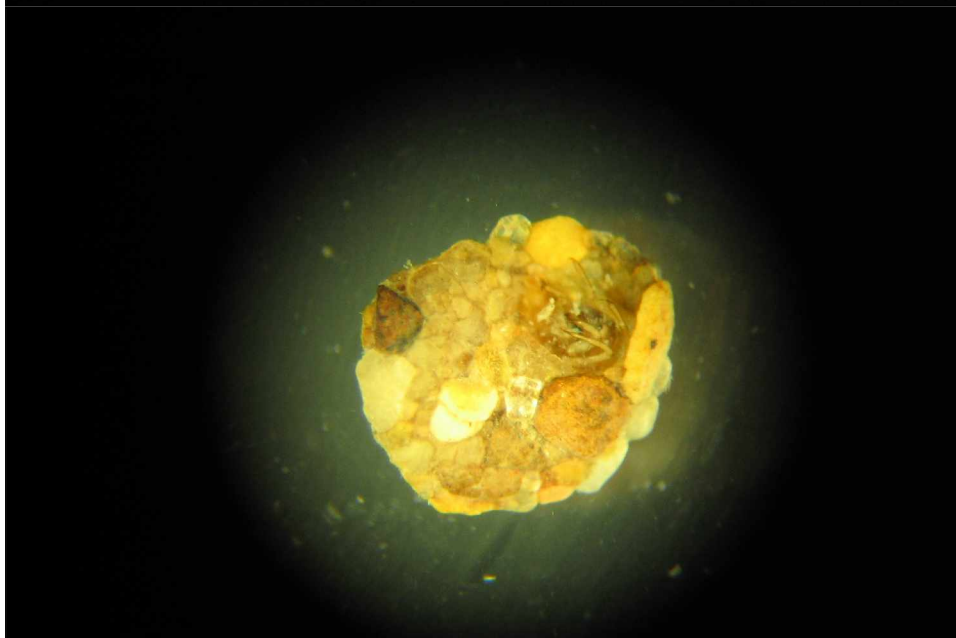


Lost River
Water Quality
Monitoring Study
Vial 16
Photo 16

1/3/05

Family: *Chironomidae*

Stations 1,2,3



Lost River
Water Quality
Monitoring Study
Vial 17
Photo 17

1/3/05

Helicopsychidae
Helicopsyche sp.

Stations 1,3,4



Lost River
Water Quality
Monitoring Study
Vial 18
Photo 18

1/3/05

Family: *Culicidae*

Stations 1,2



Lost River
Water Quality
Monitoring Study
Photo 19
Vial 19

1/3/05

Coenagrionidae
Argia sp.

Stations 2,3,4



Lost River
Water Quality
Monitoring Study
Photo 20
Vial 20

1/3/05

Order: *Amphipoda*

Stations 2,3,4



Lost River
Water Quality
Monitoring Study
Photo 21
Vial 21

1/18/05

Heptageniidae
Stenacron sp.

Stations 2,3



Lost River
Water Quality
Monitoring Study
Photo 22
Vial 22

1/18/05

Family: *Halipiidae*

Station 2



Lost River
Water Quality
Monitoring Study
Photo 23
Vial 23

1/18/05

Family: *Elmidae*

Stations 2,3,4



Lost River
Water Quality
Monitoring Study
Photo 24
Vial 24

1/18/05

Family: *Elmidae*

Stations 2,3,4



Lost River
Water Quality
Monitoring Study
Photo 25
Vial 25

1/18/05

*Corbiculidae Corbicula
fluminea*

Stations 3,4



Lost River
Water Quality
Monitoring Study
Photo 26
Vial 26

1/18/05

Family: *Odontoceridae*

Station 4



Lost River
Water Quality
Monitoring Study
Photo 27
Vial 27

1/18/05

Family:
Hydropsychidae

Stations 1,2,3,4



Lost River
Water Quality
Monitoring Study
Photo 28
Vial 28

1/18/05

Family: *Corduliidae*

Station 4



Lost River
Water Quality
Monitoring Study
Photo 29
Vial 29

1/18/05

Family: *Planorbidae*

Station 4



Lost River
Water Quality
Monitoring Study
Photo 30
Vial 30

1/18/05

Family: *Belostomatidae*

Station 4



Lost River
Water Quality
Monitoring Study
Photo 31
Vial 31

1/18/05

Class: *Hirudinea*

Station 4



Lost River
Water Quality
Monitoring Study
Photo 32
Vial 32

1/18/05

Family: *Asellidae*

Station 4

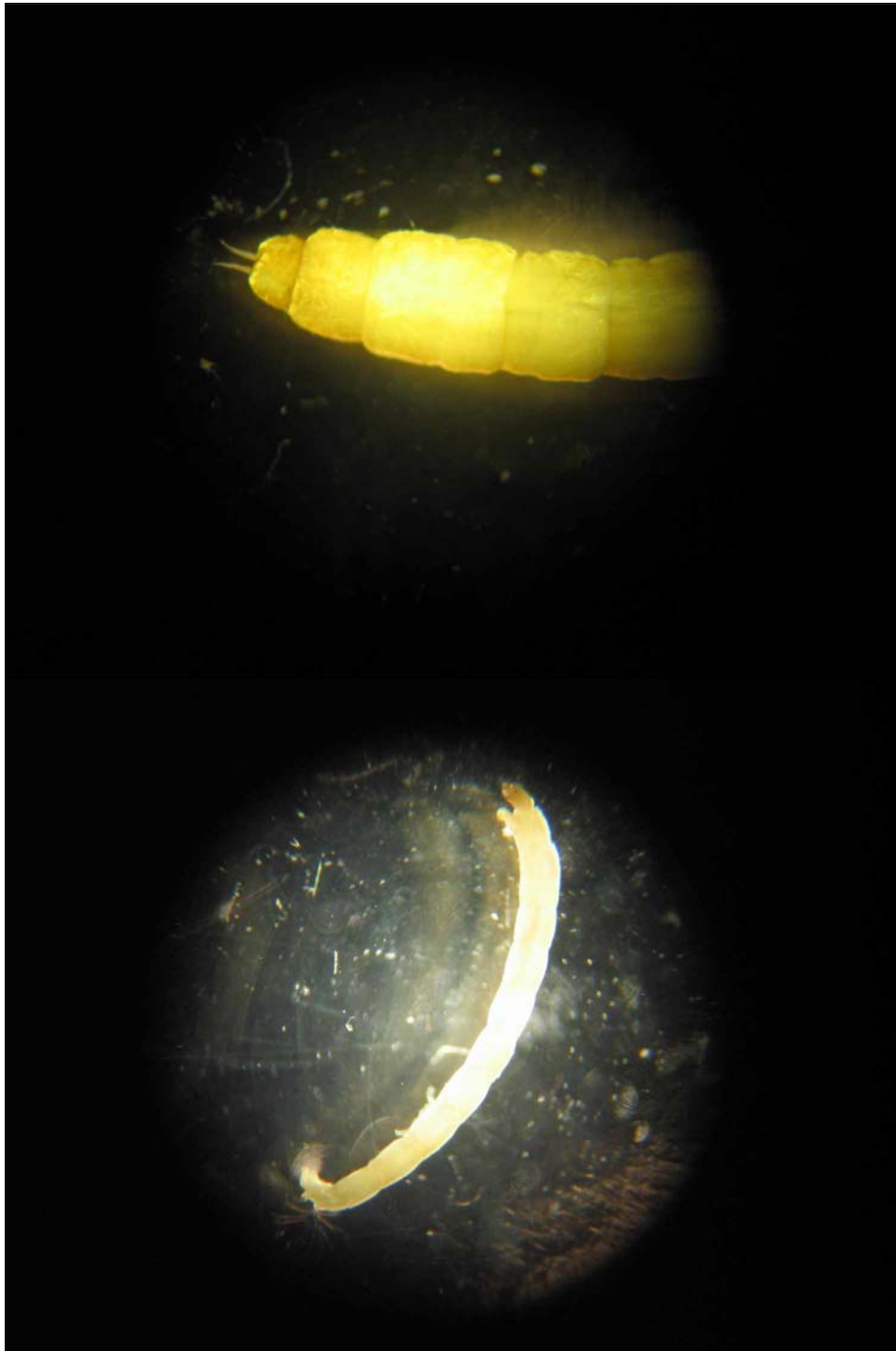


Lost River
Water Quality
Monitoring Study
Photo 33
Vial 33

2/24/05

Philopotamidae
Chimarra sp.

Stations 1,2,3



Lost River
Water Quality
Monitoring Study
Photo 34
Vial 34

2/24/05

Family: *Tipulidae*

Stations 2,3

Lost River
Water Quality
Monitoring Study
Photo 35
Vial 35

2/24/05

Family: "Red"
Chironomidae

Stations 1,2

APPENDIX III:

STATION PHOTOGRAPHS



PHOTO 1

September 9, 2004

South Fork Lost River
(Station 1) near County
Road 350N facing
upstream.
Macroinvertebrate
sampling.



PHOTO 2

September 9, 2004

South Fork Lost River
(Station 1) near County
Road 350N facing
downstream.
Macroinvertebrate
sampling.



PHOTO 3

January 6, 2005

South Fork Lost River
(Station 1) near County
Road 350N facing
upstream. Stormflow
sampling.



PHOTO 4

January 6, 2005

South Fork Lost River
(Station 1) near County
Road 350N facing
downstream. Stormflow
sampling.



PHOTO 5

September 9, 2004

Carter Creek (Station 2)
near Tater Road facing
upstream.
Macroinvertebrate
sampling.



PHOTO 6

September 9, 2004

Carter Creek (Station 2)
near Tater Road facing
downstream.
Macroinvertebrate
sampling.

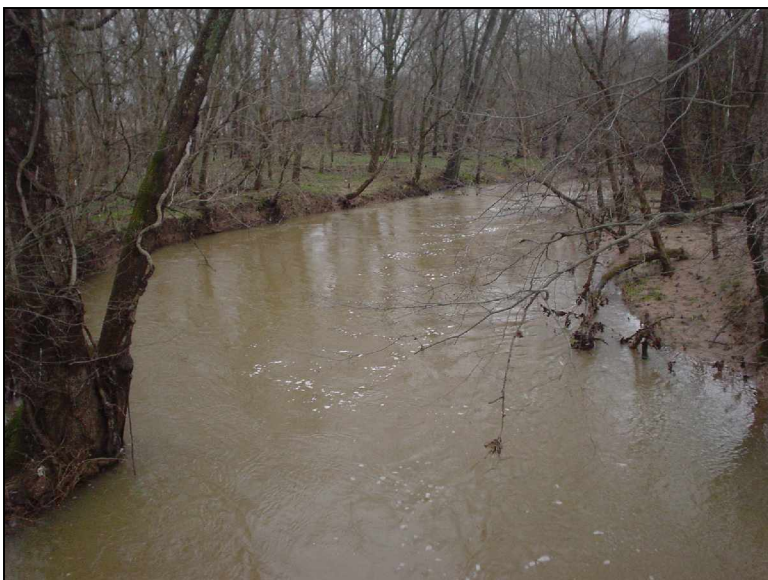


PHOTO 7

January 6, 2005

Carter Creek (Station 2)
near Tater Road facing
upstream. Stormflow
sampling.



PHOTO 8

January 6, 2005

Carter Creek (Station 2)
near Tater Road facing
downstream. Stormflow
sampling.



PHOTO 9

September 9, 2004

Lost River (Station 3) at
Tater Road facing
upstream.
Macroinvertebrate
sampling.



PHOTO 10

September 9, 2004

Lost River (Station 3) at
Tater Road facing
downstream.
Macroinvertebrate
sampling.

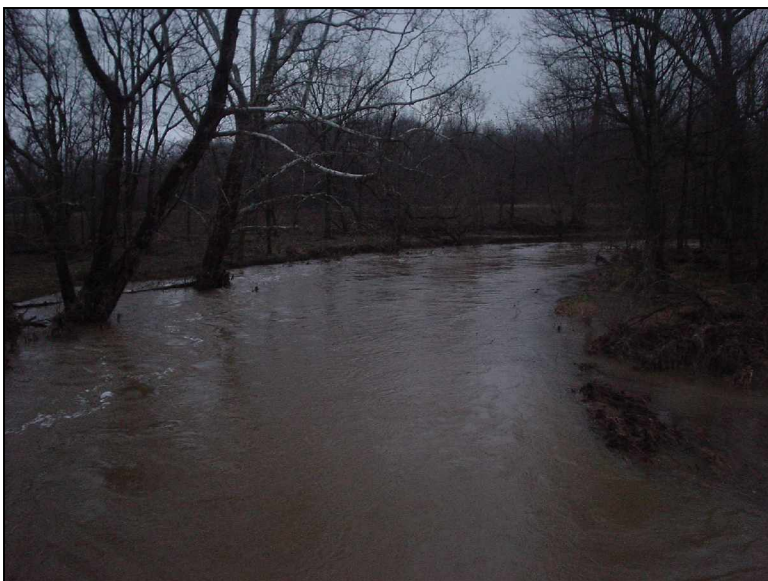


PHOTO 11

January 6, 2005

Lost River (Station 3) at
Tater Road facing
upstream. Stormflow
sampling.

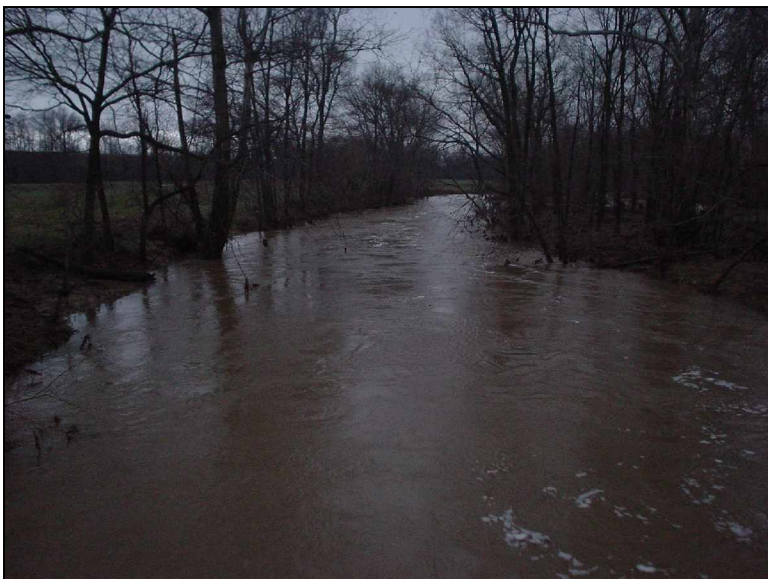


PHOTO 12

January 6, 2005

Lost River (Station 3) at
Tater Road facing
downstream. Stormflow
sampling.



PHOTO 13

September 9, 2004

Lost River (Station 4) at
Fishers Ford Bridge
upstream view.
Macroinvertebrate
sampling



PHOTO 14

September 9, 2004

Lost River (Station 4) at
Fishers Ford Bridge
downstream view.
Macroinvertebrate
sampling.

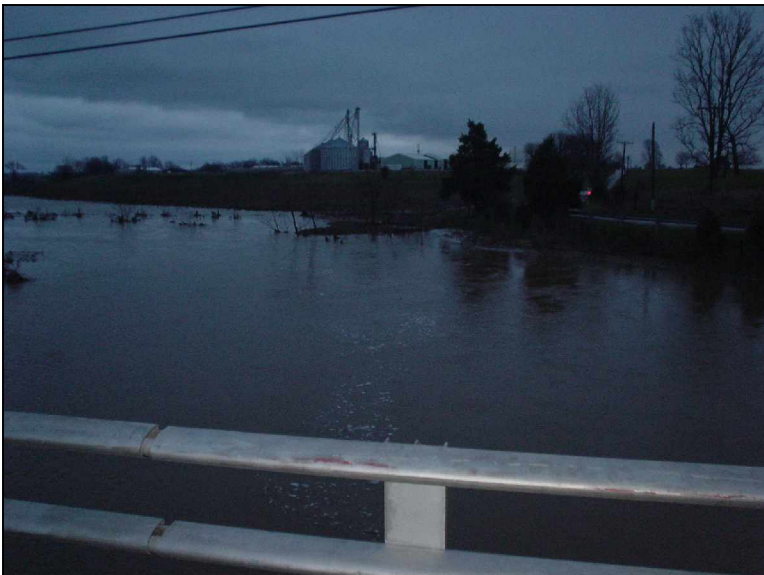


PHOTO 15

January 6, 2005

Lost River (Station 4) at
Fishers Ford Bridge
upstream view.
Stormflow sampling.

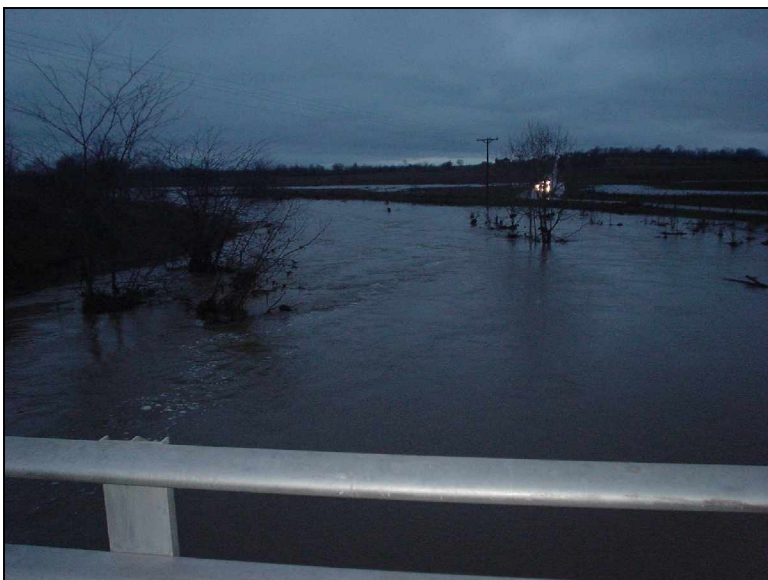


PHOTO 16

January 6, 2005

Lost River (Station 4) at
Fishers Ford Bridge
downstream view.
Stormflow sampling.



PHOTO 17

October 14, 2003

Lost River (Station 5) at
County Road 100W
upstream view of drybed.



PHOTO 18

January 5, 2005

Lost River (Station 5) at
County Road 100W
during stormflow
sampling.



PHOTO 19

June 30, 2004

Lost River (Station 6) in
Tolliver Swallow Hole
during baseflow sampling.



PHOTO 20

June 29, 2004

Lost River (Station 7) at
Wesley Chapel Gulf
during baseflow sampling.

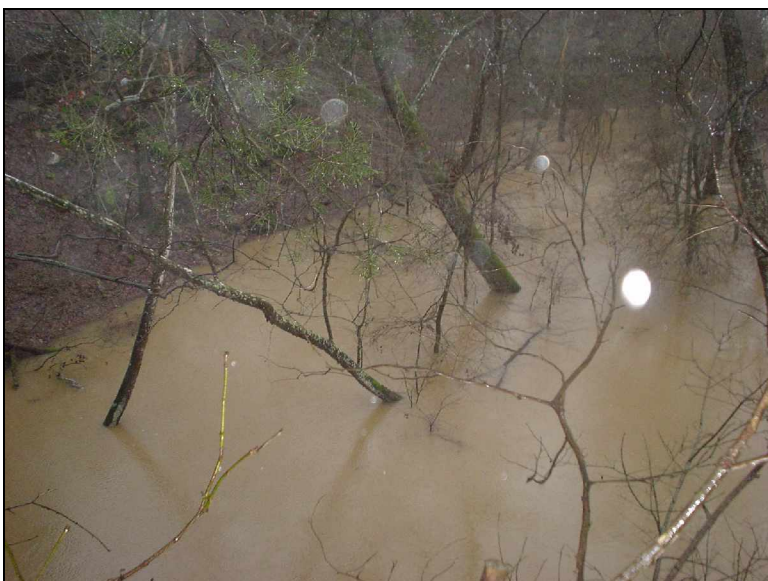


PHOTO 21

January 5, 2005

Lost River (Station 7) at
Wesley Chapel Gulf
during stormflow
sampling.



PHOTO 22

January 5, 2005

Lost River (Station 8) at
Roosevelt Road upstream
view. Stormflow samling.

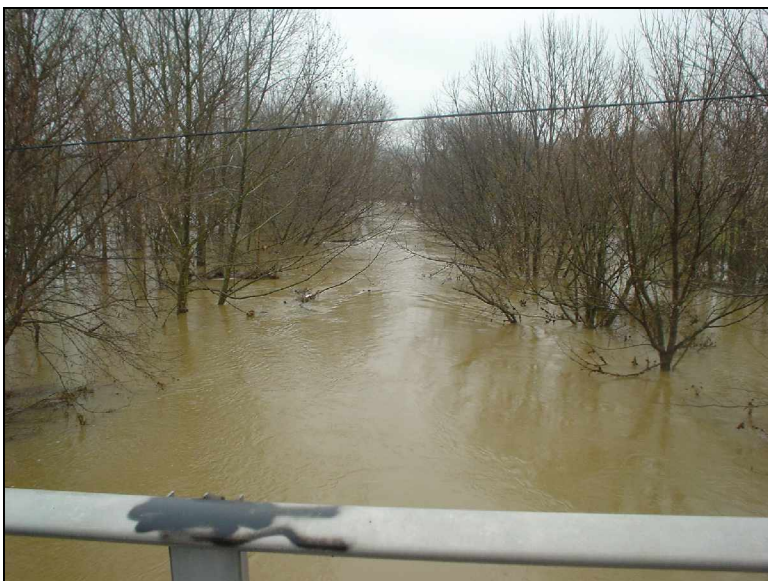


PHOTO 23

January 5, 2005

Lost River (Station 8) at
Roosevelt Road
downstream view.
Stormflow sampling.



PHOTO 24

June 29, 2005

Lost River (Station 9) at
True Rise during baseflow
sampling.



PHOTO 25

January 5, 2005

Lost River (Station 9) near
True Rise during
stormflow sampling.



PHOTO 26

January 5, 2005

Lost River (Station 10)
Orangeville Road
upstream view.
Stormflow sampling.



PHOTO 27

January 5, 2005

Lost River (Station 10)
Orangeville Road
downstream view.
Stormflow sampling.

APPENDIX IV:

LABORATORY REPORTS

**LABORATORY REPORT**


V-3 Consultants
7325 Janes Avenue
Woodridge, IL 40517

Attn: Mr. Ed Belmonte

Date Received: 01/05/2005 Report Date: 01/17/2005

Client Number: 002076 Order No: 2005010052

P.O. No.: Project:

Released By: 

Order No: 2005010052

COC No: 41169

ANALYTICAL RESULTS

Page 1

SAMPLE INFORMATION

SAMPLE NO: 1 **Collection Date:** 01/05/2005 **Time:** 08:30: **Sample Location:** Site 5 Dry Bed 100 W
Collected By: Client **Sample Matrix:** Surface Water **Sample Type:** Grab
Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	4800	/100mL	100	CMB	01/05/2005	EPA 1103.1	602437

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.281	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.467	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.234	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.88	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.015	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801



COC No: 41169

SAMPLE INFORMATION

SAMPLE NO: 2 **Collection Date:** 01/05/2005 **Time:** 09:30: **Sample Location:** Site 7 Wesley Chapel Gulf
Collected By: Client **Sample Matrix:** Surface Water **Sample Type:** Grab
Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	2000	/100mL	100	CMB	01/05/2005	EPA 1103.1	602437

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.171	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.289	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.177	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	4.41	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.014	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801

SAMPLE INFORMATION

SAMPLE NO: 3 **Collection Date:** 01/05/2005 **Time:** 12:00: **Sample Location:** Site 8 Dry Bed Roosevelt
Collected By: Client **Sample Matrix:** Surface Water **Sample Type:** Grab
Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	5000	/100mL	100	CMB	01/05/2005	EPA 1103.1	602437

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.311	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.537	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

COC No: 41169

SAMPLE INFORMATION

SAMPLE NO: 3 **Collection Date:** 01/05/2005 **Time:** 12:00: **Sample Location:** Site 8 Dry Bed Roosevelt
Collected By: Client **Sample Matrix:** Surface Water **Sample Type:** Grab
Special Instructions:

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.201	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.05	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.015	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801

SAMPLE INFORMATION

SAMPLE NO: 4 **Collection Date:** 01/05/2005 **Time:** 10:30: **Sample Location:** Site 9 True Rise Lost River
Collected By: Client **Sample Matrix:** Surface Water **Sample Type:** Grab
Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	2800	/100mL	10	CMB	01/05/2005	EPA 1103.1	602437

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.093	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.165	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.057	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	3.03	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.011	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801

COC No: 41169

SAMPLE INFORMATION

SAMPLE NO: 5 **Collection Date:** 01/05/2005 **Time:** 12:30: **Sample Location:** Site 10 Lost River
Collected By: Client **Sample Matrix:** Surface Water **Sample Type:** Grab
Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	940	/100mL	10	CMB	01/05/2005	EPA 1103.1	602437

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.098	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.177	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.051	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	3.36	mg/L	0.010	JHW	01/05/2005	SM4500-NO3	108817
Nitrogen, nitrite	0.011	mg/L	0.010	JHW	01/05/2005	SM4500-NO2	108801

**LABORATORY REPORT**

V-3 Consultants
7325 Janes Avenue
Woodridge, IL 40517

Attn: Mr. Ed Belmonte

Date Received: 01/06/2005 Report Date: 01/17/2005

Client Number: 002076 Order No: 2005010069

P.O. No.: Project:

Released By: 

Order No: 2005010069

COC No: 41186

ANALYTICAL RESULTS

Page 1

SAMPLE INFORMATION

SAMPLE NO: 1 **Collection Date:** 01/06/2005 **Time:** 09:45: **Sample Location:** Site 1 South Fork Lost River

Collected By: Client

Sample Matrix: Storm Water **Sample Type:** Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	690 B32	/100mL	10	CMB	01/06/2005	EPA 1103.1	602438

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.206	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.270	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.074	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.04	mg/L	0.010	JHW	01/06/2005	SM4500-NO3	108818
Nitrogen, nitrite	0.013	mg/L	0.010	JHW	01/06/2005	SM4500-NO2	108826

COC No: 41186

SAMPLE INFORMATION

SAMPLE NO: 2 Collection Date:01/06/2005 Time:09:15: Sample Location: Site 2 Carters Creek

Collected By: Client

Sample Matrix: Storm Water

Sample Type:Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	1600 B32	/100mL	10	CMB	01/06/2005	EPA 1103.1	602438

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.202	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.263	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.074	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.05	mg/L	0.010	JHW	01/06/2005	SM4500-NO3	108818
Nitrogen, nitrite	0.011	mg/L	0.010	JHW	01/06/2005	SM4500-NO2	108826

SAMPLE INFORMATION

SAMPLE NO: 3 Collection Date:01/06/2005 Time:08:45: Sample Location: Site 3 Lost River Tater Rd.

Collected By: Client

Sample Matrix: Storm Water

Sample Type:Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	2400 B32	/100mL	10	CMB	01/06/2005	EPA 1103.1	602438

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.253	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.326	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

COC No: 41186

SAMPLE INFORMATION

SAMPLE NO: 3 Collection Date: 01/06/2005 Time: 08:45: Sample Location: Site 3 Lost River Tater Rd.

Collected By: Client

Sample Matrix: Storm Water

Sample Type: Grab

Special Instructions:

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.077	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	2.10	mg/L	0.010	JHW	01/06/2005	SM4500-NO3	108818
Nitrogen, nitrite	0.012	mg/L	0.010	JHW	01/06/2005	SM4500-NO2	108826

SAMPLE INFORMATION

SAMPLE NO: 4 Collection Date: 01/06/2005 Time: 08:15: Sample Location: Site 4 Lost River

Collected By: Client

Sample Matrix: Storm Water

Sample Type: Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	2700 B32	/100mL	100	CMB	01/06/2005	EPA 1103.1	602438

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.256	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499
Phosphorus, total	0.364	mg/L	0.010	TLH	01/07/2005	EPA 200.7	509499

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.118	mg/L	0.01	JHW	01/06/2005	EPA 350.3	108810
Nitrogen, nitrate	1.77	mg/L	0.010	JHW	01/06/2005	SM4500-NO3	108818
Nitrogen, nitrite	0.014	mg/L	0.010	JHW	01/06/2005	SM4500-NO2	108826

ND = None Detected

REFERENCE INDEX
SA = See Attached

SC = See Footer Index

FOOTER INDEX

B32 The E. Coli. Result is an estimated count.

Environmental Consultants, Inc.

391 Newman Ave

Clarksville, IN 47129

Phone #: (812) 282-8481 Fax #: (812) 282-8554

COC #:

041165

For Lab Use Only

Stamp Here

Order Number #:

2005010052 (1-5)

Client #:

Quote #:

Chain of Custody Record

Client: V-3 Consultants			Client Contact:			Cell phone #:		
Address: 7325 Janes Avenue			Phone #:			Fax #:		
City: Woodridge			State: IL			Zip Code: 40517		
P.O. #:			Project #:					

Sample Location / ID	Sample Number	Container Number	Date Collected	Collection Time	Sample Matrix	Grab (G) or Comp (C)	Sample Temp (°C)	Test Requested
Site 5 Dry Bed 100W	5	3	1/5/05	08:30	W	G	E-Coli	NO3, NO2, NH3, T.Phos. Dis. Phos.
Site 7 Wesley Chapel Gulf	7	3	1/5/05	09:30	W	G		E. Coli, NO3, NO2, NH3, T. Phos, D. Phos
Site 8 Dry Bed Roosevelt	8	3	1/5/05	12:00	W	G		E. Coli, NO3, NO2, NH3, T. Phos, D. Phos
Site 9 True Rise Lost River	9	3	1/5/05	10:30	W	G		E. Coli, NO3, NO2, NH3, T. Phos, D. Phos
Site 10 Lost River Orangeville	10	3	1/5/05	12:30	W	G		E. Coli, NO3, NO2, NH3, T. Phos, D. Phos

Remarks:

Is this a compliance sample(s):

☐ Yes

☐ No

Please check one

Sampled By: (Printed) Ed Belmonte	(Signature)	Date: 1/5/05	Time: 13:54	am or pm
Received By: (Printed) JUDY CARIEL	(Signature)	Date: 1-5-05	Time: 1354	am or pm
Received By: (Printed)	(Signature):	Date:	Time:	am or pm
Received By: (Printed)	(Signature):	Date:	Time:	am or pm

Matrix Abbreviations:

DW = Drinking water
 WW = Wastewater
 SW = Surface water
 PW = Process water

CW = Cooling water
 S = Solid
 Feul = Feul oil
 P = Pool

AIR = Air Particulate
 SL = Shadges
 PC = Paint chips
 WP = Wipes

SOL = Solvents
 A = Animal Fat
 I = Impinger Fluid
 T = Transform oil/Fuild

LW = Liquid waste
 SDW = Solid waste
 PT = Paint
 WO = Waste/used oil

Ink = Ink
 Soil = Soil
 L = Liquid
 Oil = Oil

Systems - Sample Receiving
 Chain of Custody - General
 Mar-04

Environmental Consultants, Inc.

391 Newman Ave

Clarksville, IN 47129

Phone #: (812) 282-8481 Fax #: (812) 282-8554

COC #

For Lab Use Only

Stamp Here

Order Number #:

Client #:

Quote #:

Chain of Custody Record

Client: V-3 Consultants	Client Contact:	Cell phone #:
Address: 7325 Janes Avenue	Phone #:	Fax #:
City: Woodridge State: IL Zip Code: 40517	P.O. #:	Project #:

Sample Location / ID	Sample Number	Container Number	Date Collected	Collection Time	Sample Matrix	Grab (G) or Comp (C)	Sample Temp (°C)	Test Requested
Site 1 South Fork Lost River	LR1	3	1/6/05	09:45	W	G	E-Coli	NO3, NO2, NH3, T.Phos. Dis. Phos.
Site 2 Carter's Creek	LR2	3	1/6/05	09:15	W	G		E.Coli, NO3, NO2, NH3, T. Phos, Dis. Phos
Site 3 Lost River Tater Rd	LR3	3	1/6/05	08:45	W	G		E. Coli, NO3, NO2, NH3, T. Phos, Dis. Phos.
Site 4 Lost River Fisher's Ford	LR4	3	1/6/05	08:15	W	G		E.Coli, NO3, NO2, NH3, T. Phos, Dis. Phos.

Remarks:

Is this a compliance sample(s): ☐ Yes ☐ No
Please check one

Sampled By: (Printed) Ed Belmonte	(Signature):	Date: 01/06/05	Time: 11:12	am or pm
Received By: (Printed) Stephanie Tucker	(Signature):	Date: 1/6/05	Time: 11:12	am or pm
Received By: (Printed)	(Signature):	Date:	Time:	am or pm
Received By: (Printed)	(Signature):	Date:	Time:	am or pm

Matrix Abbreviations:

DW = Drinking water	CW = Cooling water	AIR = Air Particulate	SOL = Solvents	LW = Liquid waste	Ink = Ink
WW = Wastewater	STR = Storm water	SL = Sludges	A = Animal Fat	SDW = Solid waste	Soil = Soil
SW = Surface water	GW = Ground water	PC = Paint chips	I = Impinger Fluid	PT = Paint	L = Liquid
PW = Process water	POT = Potable water	WP = Wipes	T = Transform oil/Fuel	WO = Waste/used oil	Oil = Oil

Systems - Sample Receiving
Chain of Custody - General
Mar-04

**LABORATORY REPORT**

V-3 Consultants
7325 Janes Avenue
Woodridge, IL 40517

Attn: Mr. Ed Belmonte

Date Received: 06/29/2004 Report Date: 07/12/2004

Client Number: 002076 Order No: 2004060671

P.O. No.: Project:

Released By: John Walker

Order No: 2004060671

COC No: 38132

ANALYTICAL RESULTS

Page 1

SAMPLE INFORMATION

SAMPLE NO: 1 **Collection Date:** 06/29/2004 **Time:** 08:30: **Sample Location:** Site 1 South Fork 350 N. LR1

Collected By: Client

Sample Matrix: Surface Water **Sample Type:** Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	6300 B4	/100mL	100	CMB	06/29/2004	EPA 1103.1	602117

FIELD TESTS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	389	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.033	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.039	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.850	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	1.68	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	11.9	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.044	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.82	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 2 Collection Date:06/29/2004 Time:08:40: Sample Location: Site 2 Carters Creek Tater Rd. LR2

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	440 B4	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

FIELD TESTS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	437	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.038	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.041	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.567	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.980	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	7.83	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.022	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	8.08	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 3 Collection Date:06/29/2004 Time:08:50: Sample Location: Site 3 Lost River Tater Rd. LR3

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	310 B4	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

SAMPLE INFORMATION

SAMPLE NO: 3 **Collection Date:** 06/29/2004 **Time:** 08:50: **Sample Location:** Site 3 Lost River Tater Rd. LR3

Collected By: Client

Sample Matrix: Surface Water **Sample Type:** Grab

Special Instructions:

FIELD TESTS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	433	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.028	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.032	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.624	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.840	mg/L	0.010	JHW	06/03/2004	EPA 351.3	108261
Nitrogen, nitrate	10.0	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.033	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.96	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 4 **Collection Date:** 06/29/2004 **Time:** 09:10: **Sample Location:** Site 4 Lost River Fishers Ford LR4

Collected By: Client

Sample Matrix: Surface Water **Sample Type:** Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	90	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

FIELD TESTS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	422	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

SAMPLE INFORMATION

SAMPLE NO: 4 Collection Date:06/29/2004 Time:09:10: Sample Location: Site 4 Lost River Fishers Ford LR4

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.020	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.027	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.678	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	1.12	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	9.71	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.036	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.70	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 5 Collection Date:06/29/2004 Time:10:00: Sample Location: Site 7 Wesley Chapel Gulf LR7

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	60	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

FIELD TESTS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	429	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.062	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.074	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

SAMPLE INFORMATION

SAMPLE NO: 5 Collection Date:06/29/2004 Time:10:00: Sample Location: Site 7 Wesley Chapel Gulf LR7

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.524	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.980	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	7.03	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.013	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.36	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 6 Collection Date:06/29/2004 Time:10:20: Sample Location: Site 9 Lost River True Rise LR9

Collected By: Client

Sample Matrix: Surface Water Sample Type:Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	710 B4	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

FIELD TESTS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	439	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.064	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.087	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.500	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.700	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	6.28	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.014	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.47	SU		JHW	06/29/2004	EPA 150.1	108262

SAMPLE INFORMATION

SAMPLE NO: 7 Collection Date: 06/29/2004 Time: 10:10: Sample Location: Site 10 Lost River Orangevill Rd. LR-10

Collected By: Client

Sample Matrix: Surface Water Sample Type: Grab

Special Instructions:

BACTERIOLOGY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Escherichia Coliform	1030 B4	/100mL	10	CMB	06/29/2004	EPA 1103.1	602117

FIELD TESTS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	465	umhos/cm	1	JHW	06/29/2004	EPA 120.1	108268

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.062	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509338
Phosphorus, total	0.077	mg/L	0.010	TLH	07/01/2004	EPA 200.7	509337

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	0.488	mg/L	0.01	JHW	06/29/2004	EPA 350.3	108264
Nitrogen, Total Kjeldahl	0.840	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	6.60	mg/L	0.010	JHW	06/29/2004	SM4500-NO3	108309
Nitrogen, nitrite	0.017	mg/L	0.010	JHW	06/29/2004	SM4500-NO2	108266
pH	7.58	SU		JHW	06/29/2004	EPA 150.1	108262

REFERENCE INDEX

ND = None Detected

SA = See Attached

SC = See Footer Index

FOOTER INDEX

B4

Fecal Coliform PRESENCE CONFIRMED by EC Broth.

Environmental Consultants, Inc.

391 Newman Ave

Clarksville, IN 47129

Phone #: (812) 282-8481 Fax #: (812) 282-8554

COC #:

For Lab Use Only

Stamp Here

Order Number #:

Client #:

Quote #:

Chain of Custody Record

Client: V-3 Consultants			Client Contact:			Cell phone #:		
Address: 7325 Janes Avenue			Phone #:			Fax #:		
City: Woodridge			State: IL			Zip Code: 40517		
			P.O. #:			Project #:		

Sample Location / ID	Sample Number	Container Number	Date Collected	Collection Time	Sample Matrix	Grab (G) or Comp (C)	Sample Temp (°C)	Test Requested
Site 1 South Fork 350 N	LR1	3	6/29/04	08:30	W	G	E-Coli	NO3, NO2, NH3, T.Phos. Dis. Phos. pH, Conduct.
Site 2 Carter's Creek Tarter Rd	LR2	3	6/29/04	08:40	W	G		E-Coli, NO3, NO2, NH3, T.Phos. Dis. Phos. pH, Cond.
Site 3 Lost River Tarter Rd	LR3	3	6/29/04	08:50	W	G		E-Coli, NO3, NO2, NH3, T.Phos. Dis. Phos. pH, Cond.
Site 4 Lost River Fishers Ford	LR4	3	6/29/04	09:10	W	G		E-Coli, NO3, NO2, NH3, T.Phos. Dis. Phos. pH, Cond.
Site 7 Wesley Chapel Gulf	LR7	3	6/29/04	10:00	W	G		E-Coli, NO3, NO2, NH3, T. Phos., Dis. Phos. pH, Cond.
Site 9 Lost River True Rise	LR9	3	6/29/04	10:20	W	G		E-Coli, NO3, NO2, NH3, T. Phos., Dis. Phos. pH, Cond.
Site 10 Lost River Orangeville Rd	LR10	3	6/29/04	11:10	W	G		E-Coli, NO3, NO2, NH3, T. Phos., Dis. Phos. pH, Cond.

Remarks:

Is this a compliance sample(s): ☐ Yes ☐ No
Please check one

Sampled By: (Printed) <u>Wells</u>	(Signature): <u>[Signature]</u>	Date: <u>6/29/04</u>	Time: <u>1344</u>
Received By: (Printed) <u>Stephanie Tucker</u>	(Signature): <u>[Signature]</u>	Date: <u>6/29/04</u>	Time: <u>1344</u>
Received By: (Printed)	(Signature):	Date:	Time:
Received By: (Printed)	(Signature):	Date:	Time:

Matrix Abbreviations:
 WW = Wastewater
 SW = Surface water
 PW = Process water
 DW = Drinking water
 STR = Storm water
 GW = Ground water
 POT = Potable water
 CW = Cooling water
 S = Solid
 Feul = Fuel oil
 P = Pool

AIR = Air Particulate
 SL = Sludges
 PC = Paint chips
 WP = Wipes

SOL = Solvents
 A = Animal Fat
 I = Impinger Fluid
 T = Transform oil/Fuild

LW = Liquid waste
 SDW = Solid waste
 PT = Paint
 WO = Waste/used oil

Ink = Ink
 Soil = Soil
 L = Liquid
 Oil = Oil

Systems - Sample Receiving
 Chain of Custody - General
 Mar-04

**LABORATORY REPORT**

V-3 Consultants
7325 Janes Avenue
Woodridge, IL 40517

Attn: Mr. Ed Belmonte

Date Received: 06/30/2004 Report Date: 08/03/2004

Client Number: 002076 Order No: 2004060706

P.O. No.:

Project:

Released By:

Order No: 2004060706

COC No: 38232

ANALYTICAL RESULTS

Page 1

SAMPLE INFORMATION

SAMPLE NO: 1 Collection Date: 06/30/2004 Time: 10:30: Sample Location: Site 6 Tolliver Swallow Hole
Collected By: Client Sample Matrix: Surface Water Sample Type: Grab
Special Instructions:

FIELD TESTS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Specific Conductance	432	umhos/c	1	JHW	06/30/2004	EPA 120.1	108269

METALS

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Phosphorus, dissolved	0.054	mg/L	0.010	TLH	07/07/2004	EPA 200.7	509341
Phosphorus, total	0.064	mg/L	0.010	TLH	07/07/2004	EPA 200.7	509341

WET CHEMISTRY

PARAMETER	RESULT	UNITS	DETECTION LIMIT	ANALYST	DATE ANALYZED	METHOD	QC ID NO
Ammonia nitrogen	1.02	mg/L	0.01	JHW	07/01/2004	EPA 350.3	108265
Nitrogen, Total Kjeldahl	1.40	mg/L	0.010	JHW	06/30/2004	EPA 351.3	108261
Nitrogen, nitrate	0.864	mg/L	0.010	JHW	06/30/2004	SM4500-NO3	108337
Nitrogen, nitrite	<0.010	mg/L	0.010	JHW	06/30/2004	SM4500-NO2	108267
pH	7.30	SU		BKE	06/30/2004	EPA 150.1	1010677

Environmental Consultants, Inc.

391 Newman Ave

Clarksville, IN 47129

Phone #: (812) 282-8481 Fax #: (812) 282-8554

COC #:

For Lab Use Only

Stamp Here

Order Number #: 2004060706-1

Client #:

Quote #:

Chain of Custody Record

Client: V-3 Consultants	Client Contact:	Cell phone #:
Address: 7325 Janes Avenue	Phone #:	Fax #:
City: Woodridge State: IL Zip Code: 40517	P.O. #:	Project #:

Sample Location / ID	Sample Number	Container Number	Date Collected	Collection Time	Sample Matrix	Grab (G) or Comp (C)	Sample Temp (°C)	Test Requested
Site 6 Tolliver Swallow Hole	LR6	2	6/30/04	10:30	W	G	XXXXXX	NO3, NO2, NH3, T.Phos. Dis. Phos. pH and Conductivity

Remarks:

Is this a compliance sample(s):

☐ Yes ☐ No
Please check one

Sampled By: (Printed) Wally Levernier	(Signature) Wally Levernier	Date: 6/30/04	Time: 4:00	am or pm
Received By: (Printed) Judy Carlier	(Signature) Judy Carlier	Date: 7/30/04	Time: 4:00	am or pm
Received By: (Printed)	(Signature)	Date:	Time:	am or pm
Received By: (Printed)	(Signature)	Date:	Time:	am or pm

Matrix Abbreviations:

DW = Drinking water
STR = Storm water
WW = Wastewater
SW = Surface water
PW = Process water

CW = Cooling water
S = Solid
Feul = Fuel oil
P = Pool

AIR = Air Particulate
SL = Sludges
PC = Paint chips
WP = Wipes

SOL = Solvents
A = Animal Fat
I = Impinger Fluid
T = Transform oil/Fuel

LW = Liquid waste
SDW = Solid waste
PT = Paint
WO = Waste/used oil

Ink = Ink
Soil = Soil
L = Liquid
Oil = Oil

Systems - Sample Receiving
Chain of Custody - General
Mar-04

APPENDIX V:

IDEM DATA

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

Site Information

SubBasin: Lower East Fork White **14 digit HUC:** 05120208150030 **LSite:** WEL150-0007
Site: Lost River **Location:** 425 N **County:** Orange
Latitude: 38 37 25.989 **Longitude:** -86 20 26.120 **IASNatRegion:** 10A **Topo:** 1-33 **Segment:** 77
Ecoregion: Interior Plateau **DrainageArea (sq.miles):** 35 **Gradient (ft/mile):** 10.35

Sample

SampleNumber: AA11724 **EventID:** 02544 **SampleMediumCollected:** Macro + FishComm + FishTiss
SampleDate: 8/6/2002 **SurveyCrewChief:** SLS **SampleTime:** 12:29:00 PM **HydroLabNumber:** BSS-4
WaterFlowType: Pool **WaterAppearance:** Clear **SkyConditions:** Scattered **AirTemperature:** 76-85
WindDirection: East (90 degrees) **WindStrength:** Light
DissolvedO2 (mg/l): 8.649 **pH:** 7.53 **WaterTemp (°C):** 24.75 **SpecificConductivity (µS/cm):** 461 **Turbidity (NTU):** 13
SpecialNotes:

ElectrofishingEquipment: Backpack **Voltage:** 200 **Avg.StreamWidth (m):** 11.8 **DistanceFished (m):** 195
SecondsFished: 2008 **WaterDepthAvg (m):** 0.3 **WaterDepthMax (m):** 0.5 **TimeAtSite:** 3:30
BridgeInReach: **ReachRepresentative:** **WhyReachNotRepresentative:**
SpecialComments:

Habitat

TotalScore (max100): 70 **SubstrateScore (max20):** 15 **InstreamCoverScore (max20):** 14 **ChannelMorphologyScore (max20):** 16
RiparianZone&BankErosionScore(max10): 6 **Pool/GlideQualityScore (max12):** 6 **Riffle/RunScoreQuality (max8):** 3
GradientScore (max10): 10 **%Pool** 50 **%Riffle:** 15 **%Run:** 35 **%Glide:** 0 **CanopyCoverPctOpen:** 60.06
SubjectiveRating: 7 **AestheticRating:** 7 **NOTES:**

Fish Community Index of Biotic Integrity (IBI)

Information

Actual Observation

Metric Score

Actual Observation

Metric Score

SpeciesCount:	15	3	SensitiveSpeciesCount:	5	3
Darter/Madtom/SculpinSpeciesCount:	2	0	%TolerantIndividuals:	12.9	5
DarterSpeciesCount:	1	3	%OmnivoreIndividuals:	8.4	5
%LargeRiverIndividuals:	0.0	0	%InsectivoreIndividuals:	36.6	3
%HeadwaterIndividuals:	4.0	0	%PioneerIndividuals:	55.5	0
SunfishSpeciesCount:	4	5	%CarnivoreIndividuals:	9.3	5
CentrarchidaeSpeciesCount:	5	0	Total #of Individuals(CPUE):	760	5
MinnowSpeciesCount:	6	0	CPUElessGizzardShads:	760	0
SuckerSpeciesCount:	1	3	%SimpleLithophilicInd.:	15.0	1
RoundBodySuckerSpeciesCount:	1	0	%Ind.withDeformities,	0.0	5
SalmonidaeSpeciesCount:	0	0	ErodedFins,Lesions,&Tumors:		

TotalIBIScore 46
(min 6=no fish): max=60

Metrics are dependent on Ecoregion and Drainage Area.
 Metrics can score a 1, 3, or 5 depending on calibration.

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

SampleNumber: AA1172 **EventID:** 02544 **LSite:** WEL150-0007 **County:** Orange
StreamName: Lost River **LocationDescription:** 425 N

Common Name	Individual Fish Count	Deformities	Eroded Fins	Lesions	Tumors	Multiple Anomalies
Bluegill	28	0	0	0	0	0
Bluntnose Minnow	64	0	0	0	0	0
Central Stoneroller	315	0	0	0	0	0
Creek Chub	32	0	0	0	0	0
Green Sunfish	1	0	0	0	0	0
Hornyhead Chub	35	0	0	0	0	0
Longear Sunfish	29	0	0	0	0	0
Mottled Sculpin	30	0	0	0	0	0
Northern Hogsucker	9	0	0	0	0	0
Orangethroat Darter	10	0	0	0	0	0
Redfin Shiner	40	0	0	0	0	0
Rock Bass	28	0	0	0	0	0
Smallmouth Bass	43	0	0	0	0	0
Striped Shiner	95	0	0	0	0	0
Yellow Bullhead	1	0	0	0	0	0

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

Site Information

SubBasin: Lower East Fork White **14 digit HUC:** 05120208150010 **LSite:** WEL150-0008
Site: S Fk Lost River **Location:** Vernon School Rd **County:** Washington
Latitude: 38 35 27 **Longitude:** -86 15 42 **IASNatRegion:** 10A **Topo:** 1-33 **Segment:** 96
Ecoregion: Interior Plateau **DrainageArea (sq.miles):** 6 **Gradient (ft/mile):** 21.16

Sample

SampleNumber: DA10864 **EventID:** 97064 **SampleMediumCollected:** Water + FishComm
SampleDate: 9/9/1997 **SurveyCrewChief:** SDH **SampleTime:** 3:00:00 PM **HydroLabNumber:** 4
WaterFlowType: **WaterAppearance:** **SkyConditions:** **AirTemperature:**
WindDirection: **WindStrength:**
DissolvedO2 (mg/l): 6.44 **pH:** 7.83 **WaterTemp (°C):** 19.57 **SpecificConductivity (µS/cm):** 420 **Turbidity (NTU):** 23.4
SpecialNotes:

ElectrofishingEquipment: Backpack **Voltage:** 300 **Avg.StreamWidth (m):** 4.8 **DistanceFished (m):** 75
SecondsFished: 971 **WaterDepthAvg (m):** 0.4 **WaterDepthMax (m):** 0.6 **TimeAtSite:** 1:15
BridgeInReach: **ReachRepresentative:** **WhyReachNotRepresentative:**
SpecialComments:

Habitat

TotalScore (max100): 72 **SubstrateScore (max20):** 14 **InstreamCoverScore (max20):** 18 **ChannelMorphologyScore (max20):** 16
RiparianZone&BankErosionScore(max10): 7 **Pool/GlideQualityScore (max12):** 6 **Riffle/RunScoreQuality (max8):** 3
GradientScore (max10): 8 **%Pool** 70 **%Riffle:** 20 **%Run:** 10 **%Glide:** 0 **CanopyCoverPctOpen:** 1
SubjectiveRating: 8 **AestheticRating:** 8 **NOTES:**

Fish Community Index of Biotic Integrity (IBI)

Information

	Actual Observation	Metric Score		Actual Observation	Metric Score
SpeciesCount:	9	3	SensitiveSpeciesCount:	4	5
Darter/Madtom/SculpinSpeciesCount:	1	1	%TolerantIndividuals:	31.7	3
DarterSpeciesCount:	1		%OmnivoreIndividuals:	0.0	5
%LargeRiverIndividuals:			%InsectivoreIndividuals:	53.7	5
%HeadwaterIndividuals:	0.0	1	%PioneerIndividuals:	41.5	3
SunfishSpeciesCount:	3		%CarnivoreIndividuals:	9.8	
CentrarchidaeSpeciesCount:			Total #of Individuals(CPUE):	41	1
MinnowSpeciesCount:	4	3	CPUElessGizzardShads:		
SuckerSpeciesCount:	0		%SimpleLithophilicInd.:	17.1	1
RoundBodySuckerSpeciesCount:			%Ind.withDeformities,	0.0	1
SalmonidaeSpeciesCount:			ErodedFins,Lesions,&Tumors:		
			TotalIBIScore	32	
			(min 6=no fish):		max=60

Metrics are dependent on Ecoregion and Drainage Area.
Metrics can score a 1, 3, or 5 depending on calibration.

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

SampleNumber: DA1086 **EventID:** 97064 **LSite:** WEL150-0008 **County:** Washington
StreamName: S Fk Lost River **LocationDescription:** Vernon School Rd

Common Name	Individual Fish Count	Deformities	Eroded Fins	Lesions	Tumors	Multiple Anomalies
Bluegill	2	0	0	0	0	0
Creek Chub	13	0	0	0	0	0
Hornyhead Chub	5	0	0	0	0	0
Longear Sunfish	7	0	0	0	0	0
Orangethroat Darter	4	0	0	0	0	0
Redfin Shiner	1	0	0	0	0	0
Rock Bass	3	0	0	0	0	0
Smallmouth Bass	1	0	0	0	0	0
Striped Shiner	3	0	0	0	0	0
Sunfish Hybrid	2	0	0	0	0	0

**Indiana Department of Environmental
Office of Water Quality-Assessment Branch- Biological Studies
Fish Tissue Contaminant Results Summary**

SiteID: WEL150-0007 USGS Hydrologic 05120208150030
Stream Name: Lost River County Orange
Description: 425 N Latitude: 38 37 25. Longitude: -86 20 26.12

Sample Date: 8/6/2002 Lab ID #: 826563-001 Fish Sample Number: AA11724-077-01
7 central stoneroller Mean Length (mm) Mean Weight
Whole 129 (121 - 150) 28 (23 - 46)

	<u>Result</u>	<u>Reporting Limit</u>	<u>Metho</u>
Lipids	8.17 %	0.1	EnChemSVO-59
Solids	30.2 %	0.1	SM2540G
Cadmium <	-1	36.538461538461	6020
Lead	70 ug/Kg ww	67.307692307692	6020
Mercury <	-1	45.045045045045	6020
Aroclor <	-1	50	8082
Aroclor 1016 <	-1	50	8082
Aroclor 1221 <	-1	50	8082
Aroclor 1232 <	-1	50	8082
Aroclor 1242 <	-1	50	8082
Aroclor 1248 <	-1	50	8082
Aroclor 1254 <	-1	50	8082
Aroclor 1260 <	-1	50	8082

Sample Date: 8/6/2002 Lab ID #: 826563-001 Fish Sample Number: AA11724-077-01

Indiana Department of Environmental Office of Water Quality-Assessment Branch- Biological Studies Fish Tissue Contaminant Results Summary

SiteID: WEL150-0007 USGS Hydrologic 05120208150030
Stream Name: Lost River County Orange
Description: 425 N Latitude: 38 37 25. Longitude: -86 20 26.12

Sample Date: 8/6/2002 Lab ID #: 826562-009 Fish Sample Number: AA11724-156-01
5 rock bass Mean Length (mm) Mean Weight
Skin-On Fillets, Scaleless 180 (153 - 201) 121 (78 - 177)

	Result	Reporting Limit	Metho
Lipids	0.835 %	0.1	EnChemSVO-59
Solids	20.9 %	0.1	SM2540G
Cadmium <	-1	38	6020
Lead <	-1	70	6020
Mercury	230 ug/Kg ww	42.735042735042	6020
2,4'-DDD <	-1	5	8081
2,4'-DDE <	-1	5	8081
2,4'-DDT <	-1	5	8081
4,4'-DDD <	-1	5	8081
4,4'-DDE <	-1	5	8081
4,4'-DDT <	-1	5	8081
Aldrin <	-1	2.5	8081
Alpha-BHC <	-1	2.5	8081
Beta-BHC <	-1	2.5	8081
Chlordane, Alpha- <	-1	2.5	8081
Chlordane, Gamma- <	-1	2.5	8081
Delta-BHC <	-1	2.5	8081
Dieldrin <	-1	5	8081
Endosulfan I <	-1	2.5	8081
Endosulfan II <	-1	5	8081
Endosulfan Sulfate <	-1	5	8081
Endrin <	-1	5	8081
Endrin Aldehyde <	-1	5	8081
Endrin Ketone <	-1	5	8081
Gamma-BHC (Lindane) <	-1	2.5	8081
Heptachlor <	-1	2.5	8081
Heptachlor Epoxide <	-1	2.5	8081
Methoxychlor <	-1	25	8081
Nonachlor, cis- <	-1	5	8081
Nonachlor, trans- <	-1	5	8081
Oxychlordane <	-1	5	8081
Pentachloroanisole <	-1	2.5	8081
Toxaphene <	-1	250	8081
Hexachlorobenzene <	-1	2.5	8081
Aroclor <	-1	50	8082
Aroclor 1016 <	-1	50	8082
Aroclor 1221 <	-1	50	8082
Aroclor 1232 <	-1	50	8082
Aroclor 1242 <	-1	50	8082
Aroclor 1248 <	-1	50	8082
Aroclor 1254 <	-1	50	8082
Aroclor 1260 <	-1	50	8082

Sample Date: 8/6/2002 Lab ID #: 826562-009 Fish Sample Number: AA11724-156-01

**Indiana Department of Environmental
Office of Water Quality-Assessment Branch- Biological Studies
Fish Tissue Contaminant Results Summary**

SiteID: WEL160-0019 USGS Hydrologic 05120208160060
Stream Name: Patoka Reservoir County Orange
Description: PATOKA RIVER Latitude: 38 31 50 Longitude: -86 34 10

Sample Date: 7/10/1996 Lab ID #: 61200783 Fish Sample Number: 61200783
2 largemouth bass Mean Length (mm) Mean Weight
Skin-On Fillets, Scaleless 327 (324 - 330) 412 (397 - 426)

		<u>Result</u>		<u>Reporting Limit</u>	<u>Metho</u>
	Lipids	0.54	%		
	Cadmium B	34.3	ug/Kg ww		
	Lead B	22.3	ug/Kg ww		
	Mercury	634	ug/Kg ww		
	2,4'-DDD <	-1	ug/Kg ww	10	
	2,4'-DDE <	-1	ug/Kg ww	10	
	2,4'-DDT <	-1	ug/Kg ww	20	
	4,4'-DDD <	-1	ug/Kg ww	10	
	4,4'-DDE <	-1	ug/Kg ww	20	
	4,4'-DDT <	-1	ug/Kg ww	20	
	Aldrin <	-1	ug/Kg ww	8	
	Alpha-BHC <	-1	ug/Kg ww	8	
	Beta-BHC <	-1	ug/Kg ww	8	
	Chlordane, Alpha- <	-1	ug/Kg ww	8	
	Chlordane, Gamma- <	-1	ug/Kg ww	8	
	Delta-BHC <	-1	ug/Kg ww	8	
	Dieldrin <	-1	ug/Kg ww	10	
	Endosulfan I <	-1	ug/Kg ww	20	
	Endosulfan II <	-1	ug/Kg ww	20	
	Endosulfan Sulfate <	-1	ug/Kg ww	20	
	Endrin <	-1	ug/Kg ww	10	
	Endrin Aldehyde <	-1	ug/Kg ww	10	
	Endrin Ketone <	-1	ug/Kg ww	10	
	Gamma-BHC (Lindane) <	-1	ug/Kg ww	8	
	Heptachlor <	-1	ug/Kg ww	8	
	Heptachlor Epoxide <	-1	ug/Kg ww	8	
	Methoxychlor <	-1	ug/Kg ww	20	
	Nonachlor, cis- <	-1	ug/Kg ww	8	
	Nonachlor, trans- <	-1	ug/Kg ww	16	
	Oxychlordane <	-1	ug/Kg ww	8	
	Pentachloroanisole <	-1	ug/Kg ww	16	
	Toxaphene <	-1	ug/Kg ww	20	
	Hexachlorobenzene <	-1	ug/Kg ww	10	
	Total PCBs <	-1	ug/Kg ww	50	

Sample Date: 7/10/1996 Lab ID #: 61200783 Fish Sample Number: 61200783

**Indiana Department of Environmental
Office of Water Quality-Assessment Branch- Biological Studies
Fish Tissue Contaminant Results Summary**

SitelD: WEL150-0008 USGS Hydrologic 05120208150010
Stream Name: S Fk Lost River **County** Washington
Description: Vernon School Rd **Latitude:** 38 35 27 **Longitude:** -86 15 42

Sample Date: 9/9/1997 **Lab ID #:** 974252021 **Fish Sample Number:** 974252021
3 creek chub **Mean Length (mm)** **Mean Weight**
Whole 169 (162 - 173) 47 (42 - 50)

	<u>Result</u>	<u>Reporting Limit</u>	<u>Metho</u>
Lipids	3.38 %		
Solids	19.4 %		
Cadmium <	-1 ug/Kg ww	20	
Chromium B	100 ug/Kg ww		
Copper N	1680 ug/Kg ww		
Lead	1130 ug/Kg ww		
Mercury <	-1 ug/Kg ww	40	
Nickel <	-1 ug/Kg ww	180	
Zinc	21300 ug/Kg ww		
2,4'-DDD <	-1 ug/Kg ww	10	
2,4'-DDE <	-1 ug/Kg ww	20	
2,4'-DDT <	-1 ug/Kg ww	20	
4,4'-DDD <	-1 ug/Kg ww	10	
4,4'-DDE <	-1 ug/Kg ww	20	
4,4'-DDT <	-1 ug/Kg ww	20	
Aldrin <	-1 ug/Kg ww	8	
Alpha-BHC <	-1 ug/Kg ww	8	
Beta-BHC <	-1 ug/Kg ww	8	
Chlordane, Alpha- <	-1 ug/Kg ww	8	
Chlordane, Gamma- <	-1 ug/Kg ww	8	
Delta-BHC <	-1 ug/Kg ww	8	
Dieldrin <	-1 ug/Kg ww	10	
Endosulfan I <	-1 ug/Kg ww	20	
Endosulfan II <	-1 ug/Kg ww	20	
Endosulfan Sulfate <	-1 ug/Kg ww	20	
Endrin <	-1 ug/Kg ww	10	
Endrin Aldehyde <	-1 ug/Kg ww	10	
Endrin Ketone <	-1 ug/Kg ww	10	
Gamma-BHC (Lindane) <	-1 ug/Kg ww	8	
Heptachlor <	-1 ug/Kg ww	8	
Heptachlor Epoxide <	-1 ug/Kg ww	8	
Methoxychlor <	-1 ug/Kg ww	20	
Nonachlor, cis- <	-1 ug/Kg ww	8	
Nonachlor, trans- <	-1 ug/Kg ww	16	
Oxychlordane <	-1 ug/Kg ww	8	
Pentachloroanisole <	-1 ug/Kg ww	16	
Toxaphene <	-1 ug/Kg ww	20	
Hexachlorobenzene <	-1 ug/Kg ww	10	
Total PCBs <	-1 ug/Kg ww	50	
1-Methylnaphthalene <	-1 ug/Kg ww	20	
2-Methylnaphthalene <	-1 ug/Kg ww	20	
Acenaphthene <	-1 ug/Kg ww	50	
Acenaphthylene <	-1 ug/Kg ww	100	
Anthracene <	-1 ug/Kg ww	5	
Benzo(a)pyrene <	-1 ug/Kg ww	5	
Benzo(g,h,i)perylene <	-1 ug/Kg ww	10	

Wednesday, April 12, 2006

Page 4 of 5

**Indiana Department of Environmental
Office of Water Quality-Assessment Branch- Biological Studies
Fish Tissue Contaminant Results Summary**

Benzo(k)fluoranthene	<	-1 ug/Kg ww	5
Benzo[a]anthracene	<	-1 ug/Kg ww	5
Benzo[b]fluoranthene	<	-1 ug/Kg ww	10
Chrysene	<	-1 ug/Kg ww	5
Dibenzo[a,h]anthracene	<	-1 ug/Kg ww	10
Fluoranthene	<	-1 ug/Kg ww	7.5
Fluorene	<	-1 ug/Kg ww	10
Indeno[1,2,3-cd]pyrene	<	-1 ug/Kg ww	5
Naphthalene	<	-1 ug/Kg ww	50
Phenanthrene	<	-1 ug/Kg ww	5
Pyrene	<	-1 ug/Kg ww	5

Sample Date: 9/9/1997

Lab ID #: 974252021

Fish Sample Number: 974252021